

Research Article

Satisfaction and associated factors of E-learning among nursing undergraduates during COVID-19 pandemic in two selected state universities of Western Province, Sri Lanka

Alahakoon A.N.J.* and Meegoda M.K.D.L.

Department of Nursing and Midwifery, Faculty of Allied Health Sciences, University of Sri Jayewardenepura, Gangodawila, Sri Lanka.

Abstract

Introduction: The global education system was seriously impacted by the COVID-19 pandemic. During this time, the majority of education institutions all over the world had to discontinue their face-to-face teaching and learning methods and switch to online learning. Therefore, university students struggled with the rapid change in the education system, and they needed to adapt to the new educational environment. This study was carried out to assess the satisfaction of E-learning and associated socio-demographic characteristics among nursing undergraduates during COVID-19 pandemic in two selected universities of Western Province, Sri Lanka. **Methods:** A descriptive cross-sectional study was conducted among conveniently selected 395 undergraduate nursing students from the two study settings using a web-based/online survey. A pre-tested self-administered questionnaire prepared as a Google form was sent to all the nursing undergraduates in the two selected state universities in Sri Lanka. Descriptive statistics and Chi-square test was used to analyze the data. Ethical approval was received from the Ethics Review Committee of the Faculty of Medical Sciences, University of Sri Jayewardenepura. **Results:** The response rate for the survey was 93.6%. The majority of the participants (n=298, 75.4%) were females. Most of the respondents (n=168, 44.8%) agreed with the clarity of the lecture material provided online, and 46.2% were satisfied with the guidance and services of the lecturers. Of the sample, half (50.1%) of the participants had a good level of satisfaction on E-learning. Only the gender was associated with the satisfaction on E-learning ($p=0.024$). Most of the (n=159) female participants had a good level of satisfaction on E-learning than male participants. **Conclusions:** More than half of the undergraduate nursing students in the two selected state universities of Western Province were satisfied with the E-learning they had received during the COVID-19 pandemic. There was a significant association between gender and satisfactions on E-learning. Females had a good level of satisfaction on E-learning.

Keywords: E-learning, Satisfaction, COVID-19, Nursing undergraduates

Introduction

Coronavirus disease 2019 (COVID-19) was an aggressive and deadly infectious disease caused by SARS-CoV-2 virus. The outbreak was first identified on 31st December 2019, from Wuhan, China. It was rapidly spreading in many countries around the world. COVID-19 was declared as a global pandemic by the World Health Organization (WHO) on 11th March 2020 [1].

COVID-19 significantly impacted global

*Corresponding author: nirmalaalahakoon185@gmail.com

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economies and education systems, affecting 1.6 billion students in over 200 nations, posing a significant challenge to human life [2]. The pandemic significantly disrupted traditional educational systems, leading to the closure of schools, universities, and higher education institutions worldwide. As a result, many academic institutions had transitioned to online learning [3]. Using video conferencing apps like ZOOM, CISCO WEBEX, Google Meet, and Microsoft Teams [4].

A Saudi Arabian study found moderate acceptance and perceptions of E-learning among 340 medical students during COVID-19, with females having lower perceptions due to barriers like lack of resources and computer skills [5]. A study conducted in Indonesia, found that only 60% were satisfied about E learning due to limited internet connectivity, unstable management system, unclear material, and lack of constructive feedback [6]. A qualitative study done in Egypt revealed negative attitudes towards E-learning during the COVID-19 pandemic, with obstacles including infrastructure, technology, technical support, instructor characteristics, curriculum context, and learners' characteristics [7]. A study conducted in Uganda among medical undergraduates and nursing students found high awareness of E-learning, but they had negative attitudes on internet costs, connectivity issues, and electricity difficulties [8]. A cross-sectional survey in Saudi Arabia revealed that healthcare students were hesitant to adopt E-learning due to psychological distress, accessibility issues, inexperience, and unpreparedness [9].

In Sri Lanka, fifteen public universities were closed due to COVID-19, affecting over half a million undergraduates and graduate students [10]. The University Grants Commission and Telecommunications Regulatory Commission of Sri Lanka (TRCSL) partnered to offer free access to the University Learning Management System

for academic purposes [11]. The COVID-19 pandemic led to a surge in online learning, with universities in Sri Lanka also transitioning from traditional methods to sharing courses online, increasing demand for E-learning [3] in different disciplines under various faculties.

Main benefits of E-learning was that, students had the advantage of quarantine times to catchup on their courses [12], cost-effectiveness, and was time saving [7]. The E-learning system faced numerous obstacles too, including inadequate infrastructure and technology, inadequate technical and management support, and learner and instructor characteristics, with infrastructure being the most prevalent. Sri Lankan students in public universities supported E-learning as an effective education method, despite facing internet connection issues, technical issues, device limitations, and unclear service packages [13].

This study assessed nursing undergraduate satisfaction with E-learning during COVID-19 in Western Province, Sri Lanka, providing insights for policy-makers to implement interventions and precautionary measures to enhance online class satisfaction.

Methods

A cross-sectional descriptive study was conducted in two selected state universities in the Western Province of Sri Lanka, with the participation of conveniently selected 395 nursing students representing all academic years [Study setting 1 (n=127) and Study setting 2 (n=268)]. Sample size was calculated according to the formula $n = Z^2 P(1 - P)/d^2$ [19].

A pre-tested, self-administered questionnaire prepared as a Google form was circulated among the selected students via emails and WhatsApp social media. Socio demographic characteristics included were academic year, age, gender, ethnicity, religion, living area, type of family,

monthly income of the family, whether attended any online course earlier, and whether collage started online classes during the COVID-19 pandemic. Satisfaction on E-Learning was assessed with 18 statements which were adapted from a previously validated questionnaire in Indonesia [6]. Permission was taken from the authors for using this questionnaire. Satisfaction towards the learning process, satisfaction perception, satisfaction towards lecturers, and satisfaction toward technology support were mainly asked. The respondents had to rate their satisfaction in a five-point scale from “strongly disagree” to “strongly agree” with a higher score indicating higher satisfaction on E-learning.

Additionally, seven questions probing on the device used by participants, internet connection used for attending online classes, procedures used to conduct online classes, mode of notification of class schedules, and hours spent on online learning daily prior to the pandemic, hours spent on online learning during the COVID-19 pandemic, major barrier/s faced by participants on online learning during COVID-19 pandemic were included. Prior to conducting this study, a pre-test with 10 Pharmacy undergraduates was carried out at one of the study settings.

Students were asked to submit their responses by giving adequate time and a reminder was sent to the students two days before the deadline. The questionnaire was distributed among 422 students, however, only 395 completed the data collection process (Response rate; 93.6%).

Data were summarized by using descriptive statistics. Chi-square test was used to determine the association between the variables. The levels of satisfaction on E-learning were done considering an in-house categorization. Total E-learning scores which were above the mean value (53.15) was considered as good E-learning satisfaction, and total scores below the mean value

was considered as poor E-learning satisfaction. Data were analyzed using SPSS (Statistical Package for Social Sciences) version 26.0 software while keeping the statistical significance at $p < 0.05$.

Ethical approval was obtained from the Ethics Review Committee of Faculty of Medical Sciences, University of Sri Jayewardenepura. Permission to collect data was obtained from the Study setting 1 and Study setting 2. The respondents were asked to read the first part of the Google form which included the information sheet and after they agreed to fill the questionnaire, they were directed to provide the answers.

Results

Socio- demographic characteristics of participants are shown in Table 1. Among them the majority were females (75.4%, 298/395). The highest number of respondents were from Study setting 2, 268 (67.8%). The majority of the respondents were living in rural areas (40.5%, 160/395) and were from nuclear type families (82.3%, 325/395).

The majority of the participants used smart phones ($n = 328$, 83.0%) to attend online classes during the COVID-19 pandemic (Figure 1).

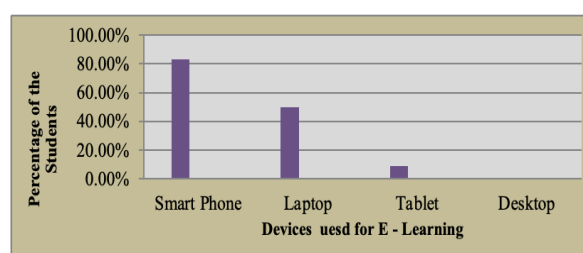


Figure 1. Devices used to attend online classes

As shown in Table 2, most respondents ($n = 315$, 79.7%) used mobile data internet connection interface to attend online classes. Some participants ($n = 39$, 35.2%) had spent 1 hour or less on online learning daily prior to the pandemic, but 46.8% ($n = 185$) of them reported to have spent more than five hours on online learning daily, during the pandemic.

The major barriers faced by students learning online during the COVID-19 pandemic was poor internet connectivity (n=314, 79.5%) and heavy workload (n=169, 42.8%) (Figure 2).

As shown in Table 3, 43.3% of the participants were dissatisfied with online learning methods compared to face-to-face learning. Some of the participants (38.0%) had actively participated in online learning. In the sample, fewer participants

Table 1: Socio-demographic characteristics of participants (n=395)

Characteristics	Total n (%)
Gender	
Female	298 (75.4%)
Male	97 (24.6%)
University	
Study setting 1	127 (32.2%)
Study setting 2	268 (67.8%)
Ethnicity	
Sinhala	359 (90.9%)
Tamil	32 (8.1%)
Muslim	4 (1.0%)
Religion	
Buddhist	353 (89.4%)
Hindu	27 (6.8%)
Christian	11 (2.8%)
Islam	4 (1.0%)
Living area	
Urban	108 (27.3%)
Peri – Urban	127 (32.2%)
Rural	160 (40.5%)
Family type	
Nuclear	325 (82.3%)
Extended	70 (17.7%)
Total monthly income of the family	
<LKR 20,000	92 (23.3%)
LKR 21,000 – 35,000	119 (30.1%)
LKR 36,000 – 50,000	106 (26.8%)
Above LKR 50,000	78 (19.7%)

Table 2: Characteristics of E-learning

Characteristics	n (%)*
Internet connection interfaces used to attend online classes	
Broadband	139 (35.2%)
Mobile data	315 (79.7%)
Procedures used to conduct online classes	
Live online classes	72 (18.2%)
Both live online classes and sending reading material	264 (66.8%)
Live classes that can be recorded	53 (13.4%)
Sending reading material	6 (1.5%)
Mode of notification of class schedule	
Via email	229 (58.0%)
Via individual text on mobile phone	13 (3.3%)
Through an institution website	71 (18.0%)
Through social media. E.g., Whatsapp or Viber	306 (76.5%)
Hours spent on online learning daily, prior to pandemic	
1 hour or less	139 (35.2%)
2-3 hours	78 (19.7%)
4-5 hours	80 (20.3%)
More than 5 hours	98 (24.8%)
Hours spent on online learning daily, during the pandemic	
1 hour or less	25 (6.3%)
2-3 hours	91 (23.0%)
4-5 hours	94 (23.8%)
More than 5 hours	185 (46.8%)

*Multiple responses were allowed

(2.8%) were strongly dissatisfied with the online learning experience.

Table 4 shows participant satisfaction towards the online lecturer. Most of the participants (52.5%) were satisfied with the lecturer's performance in using E-learning platforms. Also 44.8% of the participants agreed on the clarity of the lecture material provided online, and 46.2% were satisfied with the guidance and services of the lecturers. Table 5 shows the participant satisfaction towards technology support. About 43.8% of participants were dissatisfied with the statement "internet

connection support is adequate for online learning", while 38.2% respondents were satisfied with the availability of technological support. Of the participants, 37.5% were dissatisfied with the ability to solve technical problems in online learning.

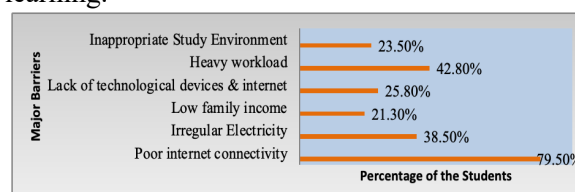


Figure 2. Major barriers faced by the participants in online learning during COVID-19 pandemic

Table 3: Satisfaction towards E-learning

	Strongly disagreed n (%)	Disagreed n (%)	Neutral n (%)	Agreed n (%)	Strongly agreed n (%)
Online learning methods is better compared to face-to-face learning method (Q1)	80 (20.3%)	171(43.3%)	37 (9.4%)	91(23.0%)	16 (4.1%)
Online learning is a good experience (Q2)	66 (16.7%)	162 (41.0%)	50 (12.7%)	106 (26.8%)	11 (2.8%)
I have the capability to do online study assignments independently (Q3)	45 (11.4%)	116 (29.4%)	41 (10.4%)	167(42.3%)	26 (6.6%)
I am active in participating in online learning (Q4)	65 (16.5%)	116 (29.4%)	40(10.1%)	150 (38.0%)	24 (6.1%)
My level of readiness for online learning is high compared to face-to face learning (Q5)	45 (11.4%)	162 (41.0%)	60 (15.2%)	113 (28.6%)	15 (3.8%)
There are multiple benefits of using technology for learning than traditional learning (Q6)	35 (8.9%)	107 (27.1%)	65 (16.5%)	159 (40.3%)	29 (7.3%)

A reasonable percentage of students strongly agreed with the perceived benefits of E-learning (Table 6).

Among the evaluated variables, only the gender was associated with the satisfaction on E-learning ($p=0.02$), where the females had a good level of satisfaction.

Discussion

E-learning has proven to be a crucial component of the global education system, with educational institutions worldwide continuing to utilize its excellent experiences during the pandemic. The

study found that most of the participants agreed with actively participating in online learning (38.0%). Online learning offered more flexibility and resources for students (38.2%), with 183 participants agreeing with this preference rather than face-to-face learning (46.3%). The study found that the greatest perceived benefits of online teaching platforms included their flexibility [14].

Nearly half of the respondents (52.5%) were satisfied with the lecturer's performance in using E-learning platforms, clarity of online lecture material (44.8%), lecturer guidance services (46.2%), and feedback on exams and assignments

Table 4: Satisfaction towards lecturers

Characteristics	Strongly disagreed n (%)	Disagreed n (%)	Neutral n (%)	Agreed n (%)	Strongly agreed n (%)
I am satisfied with the clarity of the lecture material used in the online learning method (Q10)	33 (7.4%)	139 (35.5%)	37 (7.1%)	168 (44.8%)	18 (5.3%)
I am satisfied with lecturer guidance services (Q11)	31(7.5%)	101(26.1%)	73 (15.7%)	174 (46.2%)	16 (4.7%)
I am satisfied with the lecturer's performance in using learning technology (Q12)	24 (5.7%)	104 (25.8%)	55 (11.9%)	198 (52.5%)	14 (4.1%)
I am satisfied with clarity of the assignment given by the lecturer (Q13)	26 (5.9%)	106 (25.4%)	63 (14.0%)	183 (48.9%)	17 (5.7%)
I am satisfied with lecturer feedback on the work done (Q14)	29 (6.9%)	113 (28.8%)	71(15.4%)	168 (44.8%)	14 (4.3%)
I am satisfied with the Lecturer's ability to use technology to teach online learning (Q15)	23 (5.5%)	107 (27.3%)	47 (10%)	199 (52.1%)	19 (5.2%)

(44.8%). A previous study showed that more than 45% were satisfied with the teachers providing feedback on exams and assignments [15]. However, 3.5% were dissatisfied with the lecturer's feedback on work done. Most of the respondents (43.0%) agreed with their ability to solve technical problems in online learning. A similar study done in India has shown that technical skills among students were good for online classes [16]. The majority of respondents (83.0%) used smartphones for online classes, while the least (4.1%) used desktops. This finding aligns with previous studies in Egypt [7].

Another study showed that the majority of the students preferred to use smart phone for online learning [16]. This research study shows that mobile data (79.7%) was the primary internet connection interface used to attend online classes. Prior to the COVID-19 pandemic, students used one hour or less for online learning (35.2%), but during the pandemic, they spent more than five hours on online learning daily (46.8%).

Table 5: Satisfaction towards technology support

Characteristics	Strongly disagreed n (%)	Disagreed n (%)	Neutral n (%)	Agreed n (%)	Strongly agreed n (%)
I am capable of solving technical problems in online learning (Q16)	24 (6.1%)	148 (37.5%)	48 (12.2%)	170 (43.0%)	5 (1.3%)
I have necessary technological support for online learning (Q17)	34 (8.6%)	151 (38.2%)	46 (11.6%)	152 (38.5%)	12 (3.0%)
The internet connection support is adequate for online learning (Q18)	70 (17.7%)	173 (43.8%)	45 (11.4%)	101 (25.6)	6 (1.5%)

During the COVID-19 pandemic, students faced major barriers related to online learning, including poor internet connectivity (79.5%), heavy workload (42.8%), irregular electricity (38.5%), low family income (21.3%), lack of technological devices (25.8%), and inappropriate study environment (23.5%). Similarly, several studies revealed main barriers on online learning in developing countries which included inadequate internet connection, unsuitable devices, family economic conditions, and student mental health issues [18, 13, 8]. Female participants reported higher satisfaction than males. Similarly, several studies showed that respondents were satisfied with online learning services in higher education [6, 17].

Table 6: Satisfaction on benefits of E-learning

Characteristics	Strongly disagreed n (n%)	Disagreed n (n%)	Neutral n (n%)	Agreed n (n%)	Strongly agreed n (n%)
Online learning takes longer time than face-to face learning (Q7)	31(7.8%)	142 (35.9%)	40 (10.1%)	143 (36.2%)	39 (9.9%)
Learning time is flexible to change in online learning (Q8)	29 (7.3%)	131 (33.2%)	45 (11.4%)	151 (38.2%)	39 (9.9%)
Resources used for online learning is accessible rather than face to face learning (Q9)	24 (6.1%)	114 (28.9%)	55 (13.9%)	183 (46.3%)	19 (4.8%)

These research findings contributed to make aware relevant authorities and policy-makers, as main stakeholders, on implementing appropriate interventions, and precautionary measures to increase students' satisfaction with online learning.

The limitation of this study was that the expected number of samples was not achieved due to the

COVID-19 pandemic situation. Since this study was conducted using a Google form, those who did not have good internet facilities, and lacked technological support may not have participated in this study. This study was done among nursing undergraduates in selected universities in the Western Province which limits the generalizability.

Table 8: Associations between level of satisfaction on E-learning and socio-demographic characteristics

Variables	E – learning satisfaction		P value
	Good satisfaction n (n%)	Poor satisfaction n (n%)	
Academic year			
First year	54 (13.7%)	50 (12.7%)	0.244 [#]
Second year	59 (14.9%)	47 (11.9%)	
Third year	38 (9.6%)	36 (9.1%)	
Fourth year	47 (11.9%)	64 (16.2%)	
Gender			
Female	159 (40.3%)	139 (35.2%)	0.024 [#]
Male	39 (9.9%)	58 (14.6%)	
Ethnicity			
Sinhala	180 (45.5%)	179 (45.3%)	1.000 [*]
Tamil	16 (4.0%)	16 (4.0%)	
Muslim	2 (0.5%)	2 (0.5%)	
Religion			
Buddhism	175 (44.3%)	178 (45.0%)	0.930 [*]
Hindu	15 (3.7%)	12 (3.0%)	
Christian	6 (1.5%)	5 (1.2%)	
Islam	2 (0.5%)	2 (0.5%)	
Living area			
Urban	46 (11.7%)	62 (15.6%)	0.170 [#]
Peri – Urban	69 (17.6%)	58 (14.6%)	
Rural	83 (21.0%)	77 (19.4%)	
Family type			
Nuclear	169 (42.8%)	156 (39.6%)	0.109 [#]
Extended	29 (7.4%)	41 (10.4%)	

- Pearson Chi-Square * - Likelihood Ratio

Conclusion

The majority of respondents used smartphones for online learning. Mobile data was the primary internet connection interfaces to attend online classes. Prior to the COVID-19 pandemic, students used one hour or less for online learning, but during the pandemic, they spent more than five hours on online learning daily.

During the COVID-19 pandemic, students faced major barriers in online learning, including poor internet connectivity, irregular electricity, low family income, lack of technology, heavy workload, and inappropriate study environment. However, more than half of the participants reported a good E – learning satisfaction level. Findings show that there was statistical evidence to suggest that there was an association between gender and level of E-learning satisfaction where females had a good level of satisfaction on E-learning.

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