

Experience and attitudes towards e-learning among 1st year undergraduate students in health-related faculties during COVID 19 pandemic

W. V. H. Sewwandika VH, Shanaaz UF, G. Shashini, Roshan Peiris (PhD)^{1,2,3}

ABSTRACT

Objectives: The present study aimed to determine the experience and attitudes towards e-learning, contributory factors that influence the experience and attitudes towards e-learning among 1st year undergraduate students of Faculty of Dental Sciences (FDS), Faculty of Medicine (FOM), Faculty of Veterinary Medicine and Animal Sciences (FVMAS) and Faculty of Allied Health Sciences (FAHS) of University of Peradeniya, Sri Lanka during Covid 19 outburst. **Methods:** A Google form-based questionnaire was used, and 406 responses were received. The questionnaire had demographic data and socio-economic status of participants, accessibility to internet for online learning, perceived IT ability, English literacy, experience and attitudes of participants related to online learning. A point system was employed to give a score for the categorical data (IT literacy, English literacy, experiences, attitudes, and barriers). Data was analysed using SPSS Software (version 21). **Results:** This study revealed that students of FDS showed the highest average score for good experiences and attitudes towards e learning while FAHS displayed the lowest among health-related faculties. Furthermore, students of FDS experienced minimum level of barriers while those of FVMAS experienced many barriers during online learning. This study also showed that experiences, attitudes, and barriers towards online learning are highly variable and significantly different among the students of four health related faculties of University of Peradeniya. **Conclusion:** Students of all four health related faculties still prefer face- face learning over online learning due to several unpleasant experiences and attitudes and barriers that they have understood during online learning.

Key words: E-learning, experiences and attitudes, Barriers, COVID 19, health-related faculties

1. Department of Basic Sciences, Faculty of Dental Sciences, University of Peradeniya, Sri Lanka
2. School of Dental Sciences, Universiti Sains Malaysia, Malaysia
3. College of Health Sciences, VinUniversity, Vietnam

Address of correspondence: Roshan Peiris, Department of Basic Sciences, Faculty of Dental Sciences, University of Peradeniya, Peradeniya, 20400, Sri Lanka. Tel. +94-81-239-7236.

E-mail: rdpeiris@gmail.com

Introduction

Distance learning, also called distant education, e-learning and online learning is form of education in which the main

elements include physical separation of teachers and students during instruction and use of various technologies to facilitate student-teacher and student-student

Bangladesh Journal of Medical Education 2024; 15(2); Peiris et al., publisher and licensee Association for Medical Education. This is an Open Access article which permits unrestricted non-commercial use, provided the original work is properly cited.

communication¹. Due to the impact of COVID 19 all educational institutes including tertiary educational facilities in the world had to be closed at one point. In a developing country like Sri Lanka, disruptions to tertiary education impose a major delay in creating skilled professionals who are major drivers of the economy. Therefore, every higher education institute in Sri Lanka had to rely on distance learning or e-learning in different intensities to make sure that academic programs are uninterrupted and completed as scheduled. This paradigm shift from the traditional in-classroom learning to e-learning has met with numerous novel obstacles and challenges such as perceived level of IT and English literacy, accessibility to online education platforms, availability of devices, lack of student-teacher interaction, etc. for the students as well as the educators^{2,3,4}. Academic programs especially in health-related faculties involve larger practical and lab components in comparison with the theory component. That had made further logistic and practical difficulties for those faculties to organize academic programs more effectively and usefully for the students using different e-learning platforms. Therefore, a better understanding

about these obstacles and challenges faced by the undergraduates in health-related faculties can be utilized to cope with it despite possible challenges and uplift the online education strategies.

There have been many investigating the experience and attitudes of online learning during COVID 19 pandemic. In the meantime, several studies have been found in the literature on the same subject even before the emergence of the pandemic^{5,6,7,8,9,10}. In a study done in Jordan, using 399 students from different academic disciplines at the Hashemite University revealed that in developing countries like Jordan where the technological infrastructure might not be maturely developed, the transition to e-learning had not been well received by the students¹¹. Male student respondents have accepted e-learning more smoothly with patience and rated the experience more positively compared to female student respondents, probably due to less exposure and ability to use technology by female respondents¹¹. Similar study done in Cambodia, it has been concluded that the challenges have been associated with limited technological infrastructure and capacity, socio-economic factors, lack of experience to conduct

assessments and supervise in an online mode, extra workload for teachers and education staff, and incompatibility with some specific subject matters or cultures¹². Similar challenges during online teaching had also been reported in a review article done in Nicosia, Cyprus by Adedoyin & Soykan¹³. In a study done in India using 78 teachers and 260 students at Mizoram University observed that students faced problems with connectivity and video issues due to the remoteness of their locations¹⁴. In a study in Sri Lanka, covering both state and non-state higher education institutions, revealed that students from low-income households have suffered disproportionately as they were accessing online education platforms through smartphones, using mobile data packages that many could scarcely afford. The lack of consistently stable, high speed internet access has been described as the most significant challenge².

Meanwhile, in a case study done in Peking University, China, investigating the experience and attitudes towards online teaching, the student respondents have rated e-learning just as high as other traditional methods of clinical skills teaching¹⁵. In an integrative review done by the Department of Health Sciences, University of South

Africa, which was aimed at identifying the effectiveness of online teaching and learning practices of undergraduate health sciences students and educators suggested that online teaching can be applied effectively to undergraduate students in different disciplines (nursing, medicine, radiology, physiotherapy, occupational therapy & dentistry) of health sciences⁸. A qualitative case study done in Lahore, Pakistan, using 12 faculty members and 12 students from University College of Medicine and University College of Dentistry, advocated on the broader incorporation of online technology into health professionals' education. With online learning experience, the students also become self-directed learners, which is an important competency for encouraging lifelong learning among health professionals¹⁶. A review article done in 2021 which was aimed at challenges of Covid 19 on dental education in Sri Lanka concluded that the way dentistry is practiced, and dental education is delivered have significantly been changed due to COVID-19 pandemic. They emphasized that this opportunity needs to be used to review clinical practices including safety measures, dental curriculum, teaching, and assessment tools to serve the next generation

of patients and dentists¹⁷. Furthermore, cross-sectional study was conducted in three countries including India, Nepal, and Sri Lanka about perception of dental undergraduates towards online learning during Covid 19 pandemic. It concluded that the dental undergraduates in India, Nepal and Sri Lanka showed an overall positive perception regarding the educational environment and transferable skills to the online mode of learning during the COVID-19 pandemic¹⁸.

Most of the previous studies have emphasized the advantages and disadvantages of shifting to e-learning platforms during Covid 19 pandemic in relation to medically and non-medically related undergraduate study programs. These studies have further pointed out the difficulties encountered during e-learning and the ways that can be used to overcome them in different set ups. Nevertheless, studies done on experience and attitudes towards online learning in south Asian countries are still minimal. Furthermore, most of those studies found in the literature are confined to either medical or allied health sciences students^{14,16}. However, studies conducted on dental undergraduates

especially first year undergraduates are very scanty not only in Asia but also in elsewhere^{5,10}. As 1st year students are new to the university education from the school education with less experience about the system the information elicited from the present study may be very important for implementing a better on-line learning experience in the future. Therefore, we conducted this study to investigate the experience and attitudes towards e-learning and determine the contributory factors that influence the experience and attitudes towards e-learning among 1st year undergraduate students of Faculty of Dental Sciences (FDS), Faculty of Medicine (FOM), Faculty of Veterinary Medicine and Animal Sciences (FVMAS) and Faculty of Allied Health Sciences (FAHS) of University of Peradeniya, Sri Lanka during Covid 19 outburst. We further investigated the difference in online learning experience and attitudes towards e-learning among students of different health related disciplines.

Materials and Methods

This is a questionnaire based quantitative study. A pre-tested self-administered questionnaire was used as a Google form. The questionnaire was drafted referring

previous literature on the similar subject^{8,19}. Part 01 of the questionnaire focused on demographic data and the socio-economic status of the participants. Part 02 was about the accessibility to internet for online learning. Part 03 was about perceived IT and English literacy of the participants. And part 04 examined the experience, attitudes and barriers related to online learning. Ethical approval from the Ethics Review Committee of the Faculty of Dental Sciences, University of Peradeniya was obtained for the study before data acquisition (ERC/FDS/UOP/UGR/2021/13).

This study was subjected to a pilot testing by the researchers. Five students were selected from each faculty, and they were not included as participants in the main study. The purpose of the study was explained, and the informed consent was obtained. The questionnaire was distributed among them to be completed. Finally, the problems identified in individual questions were discussed and alterations were made accordingly.

The study population was the 1st year undergraduate students of health-related faculties (FDS, FOM, FVMAS, and FAHS) of University of Peradeniya, Sri Lanka

(2018/2019 academic year). Sample size was calculated using modified version of Cochran formula. The sample sizes of each faculty were FDS= 64, FOM=136, FVMAS=70 and FAHS=124. Therefore, the total sample size was 394 and the entire 1st year student population from each faculty was taken for the study.

The Google form-based questionnaire was distributed among the participants through WhatsApp and email. Prior to data collection the participants were provided with an information sheet and informed consent form and informed consent was taken accordingly. Collected data was preceded and saved in a personal computer which is "password-protected". Saved data in the personal computer was permanently discarded and printed documents were shredded after the completion of the study.

A point system was used for analysis of English literacy, IT literacy, experience and attitudes and barriers. Five scales namely strongly agree, agree, neutral, disagree and strongly disagree were used to rank the level of above parameters. Each question was given a score according to the response given by the participant as follows.

Strongly agree, agree → '1'

Neutral, disagree and strongly disagree → '0'

Finally, the sum of scores for all questions under every parameter was taken as the total score of each parameter for each participant²⁰. Data was presented in frequencies, percentages and was given in tables and figures. As the data was not normally distributed association of the contributory factors that influence experience and attitudes towards e-learning and difference in the experience, attitudes, and barriers towards e-learning among 1st year undergraduate students of health-related faculties were analysed by using Mann Whitney U, Kruskal Wallis and Chi square test for independence. $P < 0.05$ was taken as statistical significance. Data analysis was done using the SPSS software (version 21).

Results

In the present study, a sample of 406 first year undergraduate students of health-

related faculties of University of Peradeniya, Sri Lanka from total of 553 1st year undergraduate student population was used. The sample included 69, 136, 77 and 124 participants from FDS, FOM, FVMAS, and FAHS, respectively. The sample comprised of 135 (33%) male and 271 (67%) female students. In all faculties female participants were more than male participants. The majority of students were from SLR 100000-250000 (24%) and SLR 250000-500000 (24%) monthly income groups while the least number of students were from the income group of SLR 0-50000 (14%).

The frequency of using online learning platforms in the total sample and in different faculties is shown in Figure 1. The online learning platform used by most of the participants was Zoom (99.51%) followed by Moodle (82.76%).

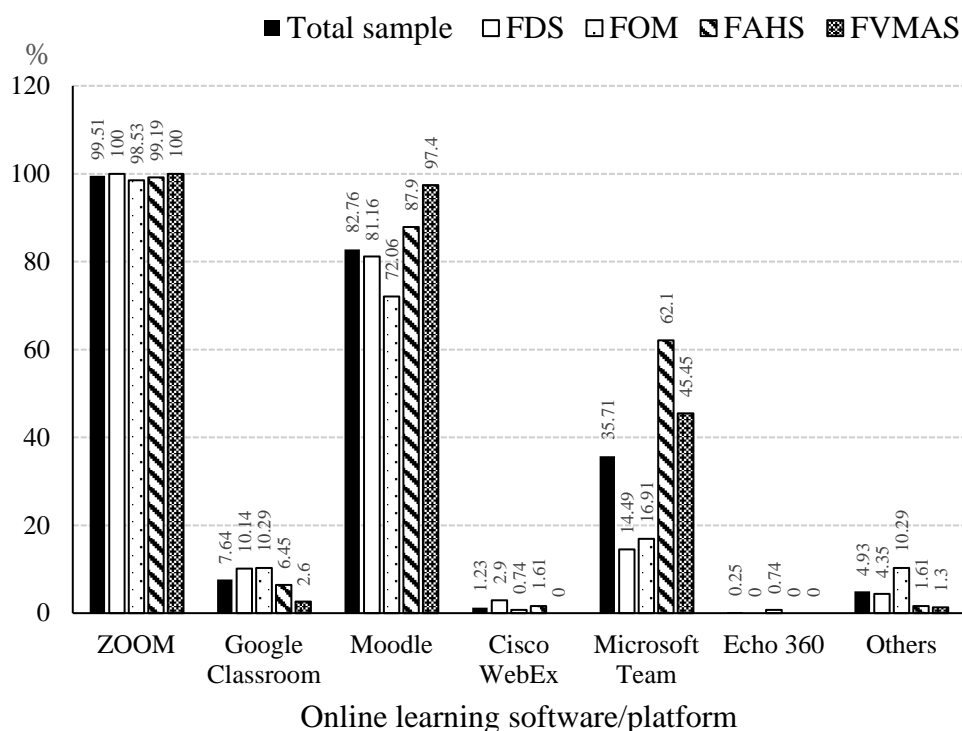


Figure 1. Use of online learning platforms in the total study sample and different faculties

The frequency of using different devices for online learning is shown in Figure 2. Majority of participants in the total sample have used Smartphones (55.67%) as the device of choice for online learning. In

addition, 50.49% of participants have used laptops. Interestingly, only 0.99% of participants had desktops for online learning.

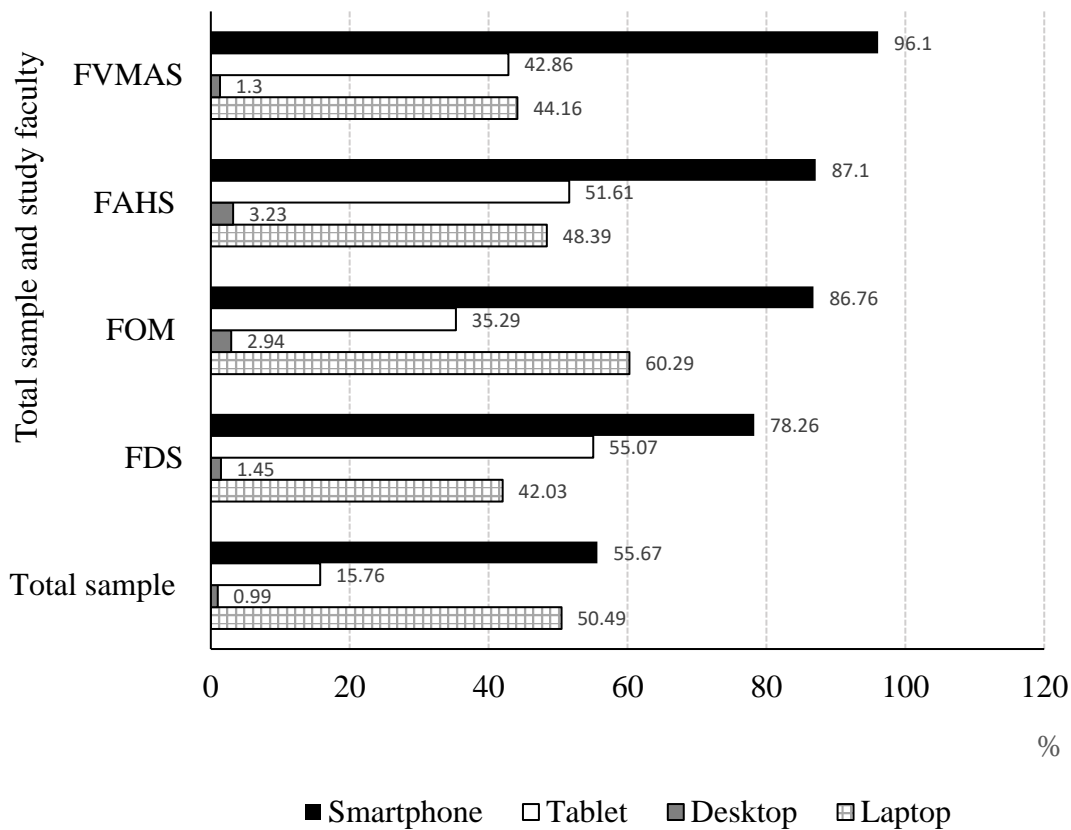


Figure 2. Devices used for online learning in the total study sample and different faculties.

The distribution of type of internet connection used for online learning is shown in Figure 3. Majority of the total participants (80.05%) have used Mobile internet connection for online learning while others

had broadband connection (45.32%). Meanwhile, 0.74% of participants haven't had any type of connection neither at home nor in the neighbourhood. (Figure 3).

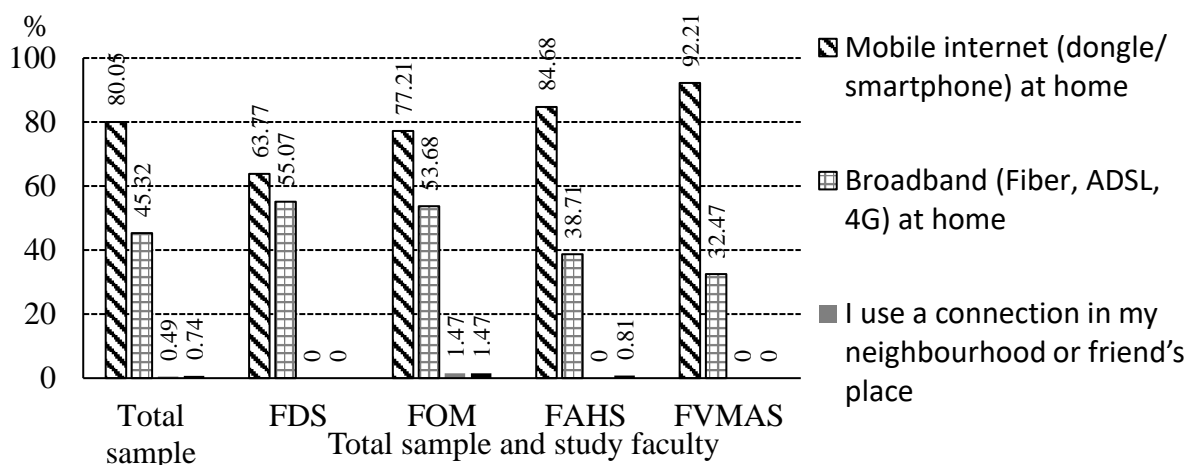


Figure 3. Type of internet connection used for online learning in the total study sample and different faculties

There were 9 questions to assess IT literacy. Therefore, according to the point system total score for each participant may vary from 0 to 9. The level of IT literacy among health-related faculties is shown in Figure 4.

Thirty four percent of the total participants have scored 9 out of 9 indicating very good IT literacy. Meanwhile, 11% of them have recorded score 0 which means very poor IT literacy.

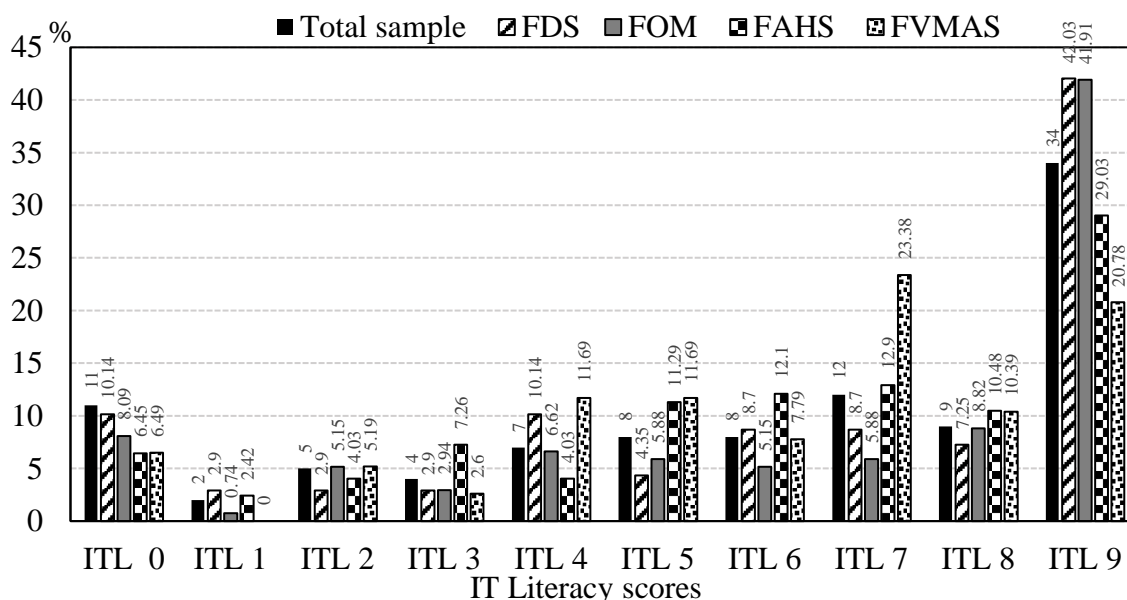


Figure 4. IT Literacy (ITL) in the total study sample and among health-related faculties.

In the meantime, except in FVMAS majority of the participants in other health related faculties, have recorded total score 9 (FDS 42.03%, FOM 41.9%, FAHS 29.03%). In FVMAS majority of participants have scored total score 7 (23.38%). Moreover, students who had very poor IT literacy been 10.14%, 8.09%, 6.45% and 6.49%, respectively in FDS, FOM, FAHS and FVMAS (Figure 4).

Five scale ranking system from 1 (very poor) to 5 (very good) was used to evaluate the English literacy. The level of English literacy is shown in Figure 5. In the total study sample, 44% of the participants had a good English literacy while only,1% were having a very poor English literacy. Similar trend was seen in all faculties (Figure 5).

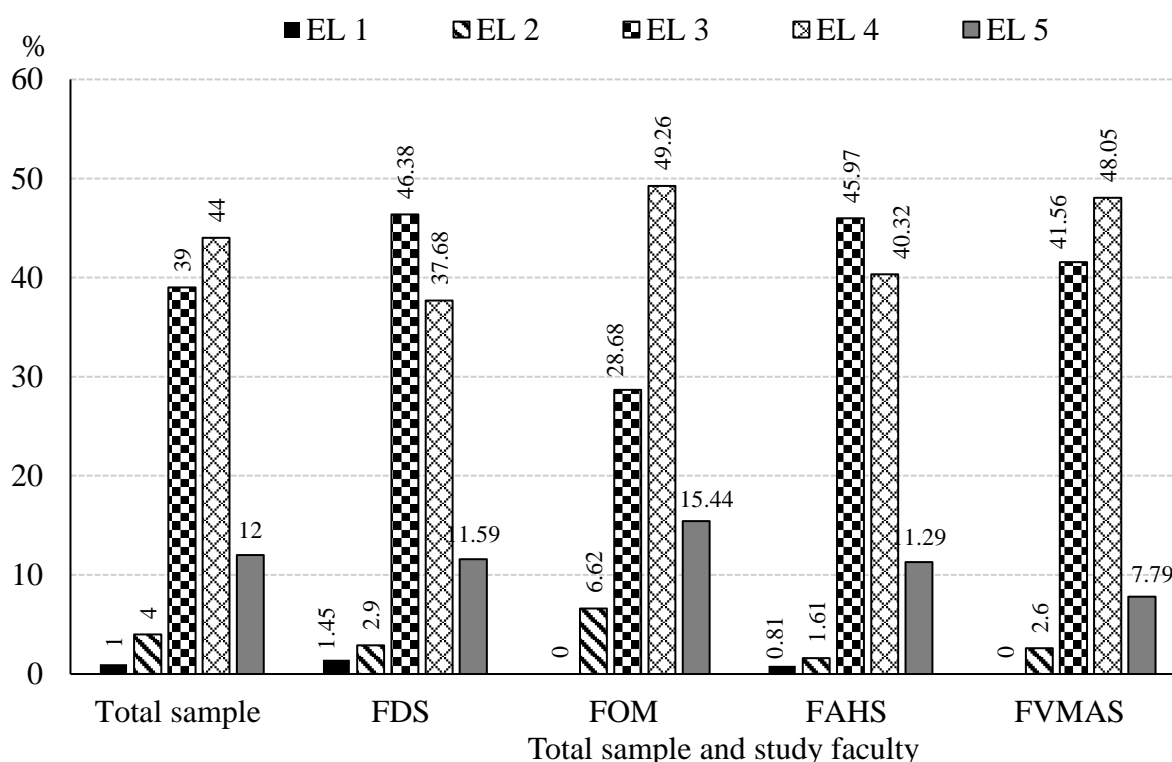


Figure 5. English Literacy (EL) in the total study sample and among health-related faculties.

There were 10 questions to assess the experience and attitudes (E & A) towards e-learning. Out of 10 questions, four questions were about good experience and attitudes, and 6 questions were about bad experience

and attitudes. Each good and bad experience and attitudes question was given a score according to the response given by the participant as follows²⁰.

Bangladesh Journal of Medical Education 2024; 15(2); Peiris et al., publisher and licensee Association for Medical Education. This is an Open Access article which permits unrestricted non-commercial use, provided the original work is properly cited.

For good experiences and attitudes questions

Strongly agree, agree → '2'

Neutral → '1'

Disagree, strongly disagree, and do not know → '0'

For bad experiences and attitudes questions

Strongly agree, agree → '0'

Neutral → '1'

Disagree, strongly disagree, and do not know → '2'

Therefore, for each question, the score 2 indicates a good experience and attitude while the score 0 indicates bad experience

and attitude. Therefore, total score for each participant may vary from 0 to 20.

In the total sample, majority of participants were in score 6-10 group (68%) and 3% were in score 16-20 group (Table 1). Meanwhile, majority of participants were in score 6-10 in all faculties. (FDS = 49%, FOM = 57%, FVMAS = 86%, FAHS = 78%) Furthermore, students in highest score group of 16 – 20 were 9%, 4% and 1% in FDS, FOM and FAHS, respectively. However, none of the students were in the 16-20 group in FVMAS (Table 1).

Table 1. Distribution of Experience & Attitudes (E&A) scores in total study sample and among health-related faculties (%).

Experience and Attitudes score	Total sample	FDS	FOM	FAHS	FVMAS
Score 0-5	7	6	12	6	1
Score 6-10	68	49	57	78	86
Score 11-15	22	36	27	15	13
Score 16-20	3	9	4	1	0

There were 7 questions to assess the barriers towards e-learning. For each question, the score 2 indicates a barrier for the students while the score 0 indicates that there is no barrier for the students. Therefore, total score for each participant may vary from 0 to 14.

Table 2 shows the distribution of barrier scores. In the total sample, 42% of participants have scored more than 12 and it indicated too much of barriers. Meanwhile, no, or minimal barriers in online learning were reported in 4% of the cases (Table 2).

Table 2. Distribution of barrier scores in total study sample and health-related faculties (%).

Barriers	Total sample	FDS	FOM	FAHS	FVMAS
Score 0-2	4	6	4	1	3
Score 3-5	5	9	4	4	3
Score 6-8	14	22	15	19	6
Score 9-11	35	37	26	52	49
Score 12-14	42	26	51	24	39

Average scores of ITL, EL, E&A, and Barriers among faculties are shown in Table 3. FDS showed the highest average for IT literacy (6.29) and lowest was shown by FOM (5.96). Meanwhile, all faculties showed average score for English literacy

around 3.5. FDS showed the highest average score for E&A (10.33) and FAHS showed the lowest (8.62). Furthermore, average barrier score was highest in FOM (10.87) and lowest in FDS (9.30).

Table 3. Average scores of ITL, EL, E&A, and Barriers among health-related faculties.

Faculty	ITL (out of 9)	EL (out of 5)	EA score (out of 20)	Barrier score (out of 14)
FDS	6.29	3.55	10.33	9.30
FOM	5.96	3.74	9.18	10.87
FVMAS	6.04	3.61	8.64	10.81
FAHS	6.13	3.60	8.62	9.68

In IT literacy, if a subject had scored a total of more than or equal 4.5 (50% of maximum possible score of 9), we considered that he/she had very good IT literacy. In English literacy, if a subject had scored a total of more than or equal 2.5 (50% of maximum possible score of 5), it was considered that he/she had a very good English literacy. Similarly, in experience and attitudes, if a subject had scored a total of more than or equal 10 (50% of maximum possible score

of 20), we considered that he/she has had a good experience and attitudes towards e learning. In barrier score, if a subject had scored a total of more than or equal 7 (50% of maximum possible score of 14), it was considered that he/she had experienced more barriers in e learning. Accordingly, Table 4 shows percentages of participants who have scored equal or more than above mentioned scores for each criterion in each faculty. FAHS showed the highest

percentage for IT literacy which was 75.81% and lowest was shown by FOM which was 67.65%. Meanwhile, all faculties showed high English literacy around 95%. FDS showed the highest percentage for

E&A which was 59.42% and FAHS showed the lowest which was 24.19%. Percentage for barrier score was highest in FVMAS (93.51%) and lowest in FDS (82.61%).

Table 4. Percentage of participants who have scored more than 50% of maximum possible score (%).

Faculty	ITL	EL	EA score	Barrier score
FDS	71.01	95.65	59.42	82.61
FOM	67.65	93.38	44.12	88.97
FVMAS	74.03	97.40	29.87	93.51
FAHS	75.81	97.58	24.19	92.74

Interfaculty comparison of ITL and EL showed no statistically significant difference. Meanwhile, E&A scores and Barrier scores among the four faculties showed statistically significant difference (E&A score, $P<0.01$, Barrier score, $P<0.01$).

Gender comparison of ITL, EL, E&A scores and Barrier scores showed no statistically significant difference in FDS and FOM. However, in FVMAS and FAHS although the gender comparison of ITL, EL, and Barrier scores showed no statistically significant difference E&A scores showed statistically significant difference. (FVMAS: $P<0.01$, FAHS: $P<0.01$).

Socioeconomic status comparison of ITL, EL, E&A scores and Barrier scores showed

no statistically significant difference in FDS. Meanwhile, in FOM, although socioeconomic status comparison of E&A scores showed no statistically significant difference, ITL, EL, and Barrier scores showed statistically significant difference. (ITL, $P<0.01$; EL, $P<0.01$; Barrier score, $P<0.01$). Furthermore, in FVMAS, socioeconomic status comparison of ITL, E&A scores and Barrier scores showed no statistically significant difference while EL showed statistically significant difference (EL, $P<0.01$). In FAHS, socioeconomic status comparison of ITL showed no statistically significant difference while EL, E&A scores, and Barrier scores showed statistically significant difference (EL, $P<0.01$; E&A score, $P<0.01$; Barrier score, $P<0.01$).

Discussion

The present research is carried out with the main purpose of determining the knowledge, skills, satisfaction, and attitudes towards e-learning among 1st year undergraduate students in health-related faculties during the Covid 19 pandemic. We have considered 4 health related disciplines (Medicine, Dental Sciences, Allied Health Sciences and Veterinary Medicine and Animal Sciences) having different amount of practical exposure in their curricula. Thus, students' perception on experiences, attitudes and barriers towards online learning are possibly variable.

Online learning platforms, Devices and Connectivity

The findings of the present study have shown that in all 4 faculties, Zoom (99.51%) and Moodle (82.76%) are being used mainly for online learning purposes, followed by Microsoft Teams (35.71%) (Figure 1). It has been revealed that health and non-health related faculties in both state and non-state universities have utilized learning management systems and web conferencing more commonly during the Covid 19 pandemic². It has also been revealed that more than 85% of state and non-state universities in Sri Lanka has used Google

Classroom and Zoom while almost all universities have used Moodle based learning management systems². During the pandemic time, Zoom has become one of the most opted synchronous communication environments for e-learning activities because of its advanced video conferencing features²¹.

The present study further revealed that many students were having some sort of device to access online learning materials. Out of the 4 devices that was mentioned in the questionnaire smartphones have been the most popular device (Figure 2). This is supported by the findings of Agung et al., in 2020²² which recorded that the use of mobile phones was more common than laptops by the students in English Language Education Study Program at Pamane Talino College of Education in Indonesia. In addition, Lazarus et al., in 2017²³ showed that the use of mobile devices in studying anatomy among medical students in South Africa has a positive impact on students' learning experience. In the present study it was further observed that 23.4% of students were using a smartphone only, as a device for online learning purposes. However, it has also been noted that mobile phones have their own limitations in terms of ram

capacity, features and performances depending on the series of the phone²².

The majority of the students have used the mobile internet (80.05%) for online learning. In addition, broadband connection was used by 45.32% of the students. In the meantime, in FOM and FAHS, there were students (FOM = 1.47%, FAHS = 0.81%) without any internet connection (Figure 3). Those students are probably from low socio-economic class who may not be able to afford for smartphones or broadband connection. The study by Hayashi et al. in 2020² which was based on online surveys and was conducted covering both state and non-state higher education institutions in Sri Lanka, revealed that 78% of students have used mobile broad band, 20% have used landline connection, and 2% without any internet connection in state higher education institutes. Furthermore, 69% have used Mobile broadband, 28% have used landline connection and 2% had no access to internet in non-state higher education institutions². These findings comply with those of the present study. In the meantime, although majority of students have access to the internet the quality of connectivity can also vary widely⁵.

English and IT literacy

The target population of this study is 1st year undergraduates who are new to the university system and all of them are following courses conducted through English medium. On top of that they had to engage in online learning which also requires a sufficient knowledge in English language ability. According to the findings of the present study, only 1%-4% of students are having a poor English literacy and it is fairly low (Figure 5). The good level of literacy in English language observed in the present study may possibly be due to the fact that all 4 faculties have conducted online English language programs before starting the respective academic programs. This could have benefited the students to adapt easily to the e-learning environment.

Regarding IT literacy of the students, FDS had the highest average (6.29) for ITL and FAHS had the highest percentage of students (75.81%) who have scored 4.5 or more out of maximum possible score of 9, while FOM had the lowest (5.96 and 67.65%, respectively) (Figure 4, Table 3, Table 4). Lower ITL may possibly be due to insufficient computer training during school years, gaps in computer skill requirements between school and university levels, etc. Our findings are supported by a cross-

sectional study done by Ranasinghe et al., in 2012²⁴ which was conducted at the Faculty of Medicine, University of Colombo, Sri Lanka. It revealed that Sri Lankan medical undergraduates had a low to intermediate level of computer literacy and nearly half of the students have obtained a computer literacy score less than or equal to 50%. They further recorded that over 60% of medical students have undergone formal training programs and only 38% have studied IT as a subject in school. Moreover, a similar study done by Dery et al., in 2016²⁵ at the College of Health Sciences, University of Ghana, revealed that Pharmacy and Medical schools had the highest proportion of students who have ever undertaken self-guided learning about computer science or IT related subjects while the lowest being the Dental Schools²⁵. Therefore, it is important for all undergraduate students especially those of health-related faculties to have a good IT knowledge prior to the university entry.

Experience and attitudes towards e-learning

Experience and attitudes towards e-learning show that FDS has the highest average for E&A score (10.33) and the highest percentage of students (59.42%) who have

scored 10 out of the maximum possible score of 20 among the 4 faculties (Table 3 and 4). The possible reasons for high E&A score observed in FDS are uploading pre-recorded learning materials to the Moodle platform which enables the students to listen to them several times, ability to learn at their own pace at a more comfortable atmosphere, the fact that lecturers are using formats like forums, discussions, and tutorials to clarify their doubts, etc. Opportunities to repeat lessons asynchronously by re-accessing learning resources have been evaluated positively by the students in previous studies^{26,27,28,20,30}. It was revealed that e-learning is beneficial for revising the syllabi in the end. At the same time, the online lecture sessions allow students to attend classes in their own comfort zones, make better notes with the audio-visual aids, address their queries more freely, and also avoid travel hassles¹⁸. On the other hand, FAHS have scored the lowest average for E&A score (8.62) and lowest percentage of students who have scored 10 out of the maximum possible score of 20 among the 4 faculties. (24.19%) (Table 3 and 4). This finding should be investigated separately in detail in order to identify the possible reasons.

When considering each faculty, the negative and positive experiences that students have encountered are almost similar. Regarding positive experiences and attitudes, most of the students (62.81%) have revealed that they have improved their IT skills due to online learning and the faculties have been helping them with sufficient resources to engage in online learning such as data free access to Moodle and zoom, financial assistance to purchase a device for online learning, etc. (Table 5). Moreover, students of FOM (15.02%) have adapted to online learning more easily compared to other 3 faculties (FDS-6.16%; FAHS-11.58%; FVMAS-5.67%) (Table 5). This is in accord with the findings of Obeidat et al., in 2020¹¹ who observed that medical students have accepted e-learning better than students in other specialties. In addition, Barticulon., et al in 2021³¹ revealed that 41% of medical students considered themselves capable of adapting to online learning in a national survey done using medical students from 54 schools in Philippines. Meanwhile, a survey done on Pakistani undergraduate dental students revealed that dental undergraduates in the 1st academic year found it more challenging to adjust to online learning compared to clinical year dental students³².

Most of the students in the present study are confident that they can achieve their academic goals through online learning. (FOM-17%; FVMAS-11.82%; FAHS-20.44%) except in FDS where the students have less confident in achieving their academic goals via online learning (FDS-5.91%) (Table 5). Distant learning is more dependent on students' ability to self-learn and it is a key factor which helps students to achieve their academic goals³³. In order to achieve academic success, students need to be guided in developing self-regulated learning strategies, which include time management, metacognition, critical thinking, and effort regulation³⁴. As students become more familiar with online learning modalities, they may be expected to adapt and have a more favourable perception towards online education³⁵.

Regarding the negative experience and attitudes towards e-learning, in FDS and FVMAS around 5.42% and 5.67% of students, respectively have revealed that the clarity of the course content is less than in-classroom learning (Table 5). In addition, students have encountered plethora of negative experiences and attitudes like going through stressful times when engaging in online learning during Covid 19

pandemic, having online exams and online tutorials which cause more anxiety than in-classroom learning, etc. Furthermore, they have experienced difficulties in accessing and processing course material due to internet connection problems. This can be attributed to the remoteness of their location which is also compounded by the weather condition where the signal strength is comparatively low causing unstable internet connectivity³⁷. The poor network is commonly a major problem in developing countries with telecommunication systems and ICT are not being properly developed^{15,31,37,38}. It is further reported that unequal access to computers and internet alters the effectiveness of online learning³⁹. In the present study, within each faculty the most significantly recorded negative experience is feeling tired after learning via electronic devices for long hours. This finding is supported by Mosleh et al., who concluded that significant percentage of students in technology disciplines in UAE have felt fatigued after having e-learning sessions more than 5 days per week. They further suggested the possible reasons for this result as cumulative psychological and physiological burden experienced due to the unprecedented experiences associated with

Covid 19 in the personal, social, and academic domains⁴⁰. More studies should be focused on reasons and ways to minimize the stress and fatigue due to online learning in order to establish a better learning environment for students.

Barriers in e-learning

Overall, undergraduate students of all faculties seemed to have experienced more barriers during online learning during Covid 19 pandemic. FOM had the highest average for Barrier score (10.87) and FVMAS had the highest percentage of students (93.51%) who have scored 7 out of the maximum possible score of 14 among the 4 faculties. It confirms that students from FOM and FVMAS have experienced more barriers than other faculties during e-learning. Meanwhile, FDS have scored the lowest average for Barrier score (9.30) and lowest percentage of students (82.61%) who have scored 7 out of the maximum possible score of 14 (Table 4 and 5). It affirms that students of FDS have experienced less barriers during e-learning. Furthermore, students of FOM and FVMAS have commented that e-learning tend to be more suitable for social science, rather than scientific fields like medical sciences which require a certain degree of hands on practical and clinical

experience. A study done in Egypt by Mahdy in 2020⁴¹ revealed that specific problems associated with online education of subjects of veterinary science included lack of application of the clinical setting,

lack of online information about certain subjects, such as veterinary anatomy, challenging of teaching the practical lessons online, and lack of contact with animals⁴¹.

Table 5. Percentage of students who agreed to each experience and attitudes questions (%).

Experience and Attitudes	TOTAL	FDS	FOM	FVMAS	FAHS
I have adapted easily to online learning	38.42	6.16	15.02	5.67	11.58
My IT skills have improved during online learning	62.81	9.85	17.24	12.56	23.15
The university has been helping you with resources for online learning (eg:- providing internet facilities)	62.56	7.88	18.23	16.50	19.95
I am confident that I can achieve my academic goals through online learning	55.17	5.91	17.00	11.82	20.44
I have difficulty in accessing and processing course materials due to internet connection problems	17.00	8.13	5.17	0.49	3.20
I feel tired after learning via technology devices for a long time	7.39	2.22	2.96	0.49	1.72
Online exams cause me more anxiety than in-classroom exams	15.02	3.20	7.14	2.22	2.46
Online tutorials cause me more anxiety than in-classroom exams	16.26	3.69	7.14	2.22	3.20
The clarity of the course content is less than in-classroom learning	21.18	5.42	4.93	5.67	5.17
Online learning during Covid 19 pandemic is stressful	9.85	3.94	2.46	0.74	2.71

Table 6. Percentage of students who agreed to each Barrier questions

Barriers	TOTAL	FDS	FOM	FVMAS	FAHS
Less student-teacher interaction	48.77	9.11	22.91	7.88	8.87
Less chances to ask questions & further clarifications	35.71	6.16	16.26	6.65	6.65
Quality of lecture is more in face to face	53.20	6.90	21.18	14.29	10.84

Bangladesh Journal of Medical Education 2024; 15(2); Peiris et al., publisher and licensee Association for Medical Education. This is an Open Access article which permits unrestricted non-commercial use, provided the original work is properly cited.

Distractions due to outside noises	72.41	7.88	24.63	15.76	24.14
Interruptions in internet connections	82.51	13.05	25.86	16.26	27.34
Difficulties in submitting the assignments	67.98	6.90	19.95	16.50	24.63
Effect on my physical & mental health.	79.80	12.07	25.86	16.75	25.12

The most common barrier experienced by the students is the interruptions in internet connection (82.51%) followed by the effect on physical & mental health (79.8%). In a study done on Students' attitudes regarding online learning during Covid-19 pandemic at the Faculty of Technical Sciences in Čačak, University in Kragujevac showed that most students had at least one issue during online classes, and the most frequent issue was internet disconnection⁴².

Less chances to ask questions and further clarifications from the teacher, (35.71%) is the least common barrier experienced by the students (Table 6). Meanwhile, 22.91% of students of FOM have experienced less student-teacher interaction and it is greater than other faculties (FDS= 9.11%, FVMAS= 7.88%, FAHS= 8.87%) (Table 6). Hayashi et al. revealed a similar finding in their study on online learning in Sri Lanka's Higher Education Institutions during the COVID-19 pandemic and confirmed that 64% of students have reported poor engagement with the

teacher in state higher education institutes in Sri Lanka while 70% have reported the same in non-state institutions². The fact that insufficient interaction between students and lecturers as negative aspects of online education has been reported in previous studies as well^{43,44}. Furthermore. It has been reported in a study done in 12 different colleges, from 5 states in India by Samra in 2021 that around 55.5% of students in the study group have felt that interactions in online learning is more challenging. Even if the pattern of teaching has changed, students still like to take up their doubts and queries in a much conventional way¹⁸.

According to the results of the present study, there is a significant difference in experiences, attitudes, and barriers towards e-learning among different health related faculties ($P < 0.01$). In addition, a statistically significant gender difference was observed in experiences and attitudes towards e-learning in the total student sample ($P < 0.01$) and separately in FVMAS ($P < 0.01$), FAHS ($P < 0.01$) as well. These findings are supported by the

conclusions made by Obeidat et al. in 2020¹¹ where they have observed that student's gender and academic specialty are associated with effectiveness of e-learning¹¹. Furthermore, Simsek et al. in 2021 also revealed that satisfaction scores of students towards online education differ significantly among the disciplines they study⁴⁵. In addition, In the present study, socioeconomic status of the students in the FOM showed statistically significant association with English literacy, IT literacy and barriers towards e-learning.

Conclusion

Experience and attitudes towards e learning are highly variable and statistically significant among disciplines of study tested in the present study. Different study programs seem to have their own challenges in implementing an effective e-learning method. Therefore, well organized study program specific schedule for e-learning which ensures the quality assurance like internet connectivity, audio-visual quality and time management is

References

1. Masalimova AR, Khvatova MA, Chikileva LS, Zvyagintseva EP, Stepanova VV, Melnik MV. Distance Learning in Higher Education During Covid-19. *Frontiers in Education*. 2022 Mar; 7:1-6.

necessary for a better e-learning experience. Furthermore, good measures need to be taken to improve e-learning and get the students to achieve their academic goals. Meanwhile, most of the students in all faculties are not confident that they can achieve their academic goals through online learning. In addition, they are concerned about less teacher-students interaction, feeling tired after using devices, clarity of content, etc. Therefore, we propose future research recommendation about the effectiveness of online learning, online learning platforms, learning goals and students' preferences and characteristics employing more analytical avenue to investigate the reasons for association between different variables.

Acknowledgements

We would like to thank 1st year undergraduates (2018/2019 academic year) of Faculty of Dental Sciences, Faculty of Medicine, Faculty of Veterinary Medicine and Animal Sciences and Faculty of Allied Health Sciences of University of Peradeniya, Sri Lanka for their participation in this study.

2. Hayashi R, Garcia M, Maddawin A. Online learning in Sri Lanka's higher education institutions during the COVID-19 pandemic. *ADB BRIEFS*. 2020 Sep; 151:1-12.
3. Subaih RHA, Sabbah SS, Al-Duais RNE. Obstacles facing teachers in Palestine while implementing e-learning during the

Bangladesh Journal of Medical Education 2024; 15(2); Peiris et al., publisher and licensee Association for Medical Education. This is an Open Access article which permits unrestricted non-commercial use, provided the original work is properly cited.

- COVID-19 pandemic. *Asian Social Science*. 2021 Mar; 17(4): 44-5.
4. Diab GMAEH, Elgahsh NF. E-learning during COVID-19 pandemic: Obstacles faced nursing students and its effect on their attitudes while applying it. *American Journal of Nursing*, 2020 Aug; 9(4): 300-14.
 5. Link TM, Marz R. Computer literacy and attitudes towards e-learning among first year medical students. *BMC medical education*. 2006 Jun; 6(1): 1-8.
 6. Gormley G J, Collins K, Boohan M, Bickle IC, Stevenson M. Is there a place for e-learning in clinical skills? A survey of undergraduate medical students' experiences and attitudes. *Medical Teacher*. 2009 Jul; 31(1): e6-e12.
 7. McCutcheon K, Lohan M, Traynor M, Martin D. A systematic review evaluating the impact of online or blended learning vs. face-to-face learning of clinical skills in undergraduate nurse education. *Journal of Advanced Nursing*. 2014 Aug; 71(2): 255-70.
 8. Van Rensburg ESJ. Effective online teaching and learning practices for undergraduate health sciences students: An integrative review. *International Journal of Africa Nursing Sciences*. 2018 Aug; 9: 73-80.
 9. Mącznik AK, Ribeiro DC, Baxter GD. Online technology use in physiotherapy teaching and learning: a systematic review of effectiveness and users' perceptions. *BMC medical education*. 2015 Sep; 15(1): 1-12.
 10. Gadbury-Amyot CC, Singh AH, Overman PR. Teaching with technology: learning outcomes for a combined dental and dental hygiene online hybrid oral histology course. *Journal of Dental Education*. 2018 Aug; 77(6): 732-43.
 11. Obeidat A, Obeidat R, Al-Shalabi M. The effectiveness of adopting e-learning during COVID-19 at Hashemite University. *International Journal of Advanced Computer Science and Applications*. 2020; 11(12):96-104.
 12. Heng K, Sol K. Online learning during COVID-19: Key challenges and suggestions to enhance effectiveness. *Cambodian Journal of Educational Research*. 2021; 1(1): 3-16.
 13. Adedoyin OB, Soykan E. Covid-19 pandemic and online learning: the challenges and opportunities. *Interactive learning environments*. 2020 Sep; 31(3): 1-13.
 14. Mishra L, Gupta T, Shree A. Online teaching-learning in higher education during lockdown period of COVID-19 pandemic. *International Journal of Educational Research Open*. 2020; 1: 100012.
 15. Bao W. COVID-19 and online teaching in higher education: A case study of Peking University. *Human behaviour and emerging technologies*. 2020; 2(2): 113-5.
 16. Mukhtar K, Javed K, Arooj M, Sethi A. Advantages, Limitations and Recommendations for online learning during COVID-19 pandemic era. *Pakistan Journal of Medical Sciences*. 2020; 36(COVID19-S4).
 17. Thilakumara IP, Jayasinghe RM, Jayasinghe RD. Facing challenges of COVID-19 on dental education in Sri Lanka. *Journal of Multidisciplinary Dental Research*. 2021 Feb; 6(2): 75-80.
 18. Samra RK, Nirola A, Verma A, Nagpal A, Thakur M. Dental students' Perception on the impact of E-learning in continuing dental education during the current pandemic scenario. *Indian Journal of Dental Sciences*. 2021 Jan; 13(2): 61.

19. Paris PG. E-Learning: A Study on Secondary Students' Attitudes towards Online Web Assisted Learning. *International Education Journal*. 2004 Jan; 5(1): 98-112.
20. Basu M. A study on knowledge, attitudes and practices about Thalassemia among general population in outpatient department at a tertiary care hospital of Kolkata, *Journal of Preventive Medicine and Holistic Health*. 2015 Jan; 1(1): 6–13.
21. Xie X, Siau K, Nah FFH. COVID-19 pandemic—online education in the new normal and the next normal. *Journal of information technology case and application research*. 2020 Nov; 22(3): 175-87.
22. Agung ASN, Surtikanti MW, Quinones CA. Students' perception of online learning during COVID-19 pandemic: A case study on the English students of STKIP PamaneTalino. *SOSHUM: Journal Sosial Dan Humaniora*. 2020 Jul;10(2): 225-35.
23. Lazarus L, Sookrajh R, Satyapal KS. Tablet technology in medical education in South Africa: a mixed methods study. *BMJ open*. 2017; 7(7): e013871.
24. Ranasinghe P, Wickramasinghe SA, Pieris WA, Karunathilake I, Constantine GR. Computer literacy among first year medical students in a developing country: A cross-sectional study. *BMC research notes*. 2012 Sept; 5(1): 1-8.
25. Dery S, Vroom FDC, Godi A, Afagbedzi S, Dwomoh D. Knowledge and use of information and communication technology by health sciences students of the University of Ghana. *Ghana Medical Journal*. 2016 Oct; 50(3): 180-8.
26. Ahmed SA, Hegazy NN, Abdel Malak HW, Cliff Kayser W, Elrafie NM, Hassanien M, Al-Hayani AA, El Saadany SA, Al-Youbi AO, Shehatar MH. Model for utilizing distance learning post COVID-19 using (PACT)TM a cross-sectional qualitative study. *BMC Medical Education*. 2020 Nov; 20(1): 1-13.
27. Altwaijry N, Ibrahim A, Binsuwaidan R, Alnajjar LI, Alsfook BA, Almutairi R. Distance education during COVID-19 pandemic: A college of pharmacy experience. *Risk Management and Healthcare Policy*. 2021 May; 14: 2099-110.
28. Aristovnik A, Keržič D, Ravšelj D, Tomaževič N, Umek L. Impacts of the COVID-19 pandemic on life of higher education students: A global perspective. *Sustainability*. 2020 Oct; 12(20): 8438.
29. Peñarrubia-Lozano C, Segura-Berges M, Lizalde-Gil M, Bustamante JC. A qualitative analysis of implementing e-learning during the COVID-19 lockdown. *Sustainability*. 2021 Mar; 13(6): 3317.
30. Turan Z, Gurol A. Emergency Transformation in Education: Stress Perceptions and Views of University Students Taking Online Course During the COVID-19 Pandemic. *HAYEF: Journal of Education*. 2020 Nov; 17(2): 222-43.
31. Baticulon RE, Sy JJ, Alberto NRI, Baron MBC, Mabulay REC, Rizada LGT, Tiu CJS, Clarion CA, Reyes JCB. Barriers to online learning in the time of COVID-19: A national survey of medical students in the Philippines. *Medical science educator*. 2021 Feb;31(2):615-26.
32. Sarwar H, Akhtar H, Naeem MM, Khan JA, Waraich K, Shabbir S, Hasan A, Khurshid, Z. Self-reported effectiveness of e-Learning classes during COVID-19 pandemic: A nation-wide survey of Pakistani undergraduate dentistry

- students. *European Journal of Dentistry*. 2020; 14(S 01): S34-S43.
33. Wang CH, Shannon DM, Ross, ME. Students' characteristics, self-regulated learning, technology self-efficacy, and course outcomes in online learning. *Distance Education*. 2013 Oct; 34(3): 302-23.
34. Broadbent J, Poon WL. Self-regulated learning strategies & academic achievement in online higher education learning environments: A systematic review. *The Internet and Higher Education*. 2015 Oct; 27:1-13.
35. Ge H, Wang X, Yuan X, Xiao G, Wang C, Deng T, Yuan Q, Xiao X. The epidemiology and clinical information about COVID-19. *European Journal of Clinical Microbiology & Infectious Diseases*. 2020 Apr; 39(6): 1011-19.
36. Rotas E, Cahapay M. Difficulties in remote learning: Voices of Philippine university students in the wake of COVID-19 crisis. *Asian Journal of Distance Education*. 2020; 15(2): 147-58.
37. Aboagye E, Yawson JA, Appiah KN. COVID-19 and E-learning: The challenges of students in tertiary institutions. *Social Education Research*. 2021; 2(1): 1-8.
38. Henaku EA. COVID-19 online learning experience of college students: The case of Ghana. *International Journal of Multidisciplinary Sciences and Advanced Technology*. 2020 Jun;1(2): 54-62.
39. Xu D, Xu Y. The Promises and Limits of Online Higher Education: Understanding How Distance Education Affects Access, Cost, and Quality. *American Enterprise Institute*. 2019 Mar; 1-40.
40. Mosleh SM, Shudifat RM, Dalky HF, Almalik MM, Alnajjar MK. Mental health, learning behaviour and perceived fatigue among university students during the COVID-19 outbreak: a cross-sectional multicentric study in the UAE. *BMC Psychology*. 2022 Mar; 10(1), 1-11.
41. Mahdy MA. The impact of COVID-19 pandemic on the academic performance of veterinary medical students. *Frontiers in veterinary science*, 2020 Oct; 7: 594261.
42. Đorić B, Blagojević M, Papić M, Stanković N. Students' Attitudes Regarding Online Learning During Covid-19 Pandemic. *Proceedings of the International Conference on Information Technology and Development of Education – ITRO Zrenjanin, Republic of Serbia*. 2020 Oct; 3: 157-60.
43. Dolmaci M, Dolmaci A. The views of the university students from foreign language preparation program on synchronous distance education. *Milli Eğitim*, 2020; 657-684.
44. Tang T, Abuhmaid AM, Olaimat M, Oudat DM, Aldhaeebi M, Bamanger E. Efficiency of flipped classroom with online-based teaching under COVID-19. *Interactive Learning Environments*. 2020 Sep; 31(2): 1077-88.
45. Simsek I, Kucuk S, Biber SK, Can T. Online learning satisfaction in higher education amidst the Covid-19 pandemic. *Asian Journal of Distance Education*. 2021; 16(1): 247-61.