

The Experience of Online Learning During COVID-19 Among Physiotherapy Undergraduates in a Lower Middle Income Country: A Report From Sri Lanka

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Abstract

Introduction/background: Online learning have existed for over a decade. However, lower middle income countries, such as Sri Lanka, have hardly utilized these services. Instead, they follow the traditional in-person teaching activities. Yet, with the onset of COVID-19, due to sheer necessity, an alternative method had to be utilized if university education was to proceed. Hence, this study's main objective was to explore the experience of online learning among physiotherapy undergraduates during the pandemic.

Method: An online cross-sectional survey was conducted among physiotherapy undergraduates from all three universities in Sri Lanka that offer a physiotherapy degree. The study questionnaire, consisting of 49 items, was formulated based on a literature review. Each item assessed an aspect of online learning.

Results: Of the 147 responses obtained, 72% were females and 50% of the participants were from the 3rd year of study. The results indicated that during the pandemic period, 63% of the participants spent between 10-40 hours on online learning. Students' perception about online learning was assessed. Higher average values were obtained for all students' perceptions statements regarding online learning. However, the perceived effectiveness of online learning, as compared to in-person learning, had a relatively low mean score. Being able to stay at home and to learn at their own pace were commonly mentioned advantages of online learning. However, 36% of participants indicated that internet connectivity issues impacted their learning whilst 78% of the participants indicated that clinical teaching and practical classes could not be replaced by online teaching. Hence, it appears that about 77% of the participants prefer a hybrid learning method, even post-pandemic, which is opined to be made more effective if the classes are more interactive, stimulating and engaging.

Conclusion: The study results indicate that there are both positive and negative aspects of online learning education. Problems such as internet connectivity issues, possibly more prominent in lower income countries, should be addressed to provide a satisfactory learning experience to students. In looking to the future, post-pandemic, a hybrid teaching method would be ideal for a study programme that requires practical classes and clinical exposure.

Background

The World Wide Web and the rapid development of the internet have provided numerous benefits to education, such as internet-based teaching-learning activities which entered mainstream education in the 21st century [1]. There are different, yet inter-related terms used in internet-based education: "distance education", "e-learning", "online learning", "blended learning", "computer-based learning", "web-based learning", and "virtual learning", and are a few such terms [1]. For instance, distance education is planned learning in which the teaching normally occurs in a different place from that of learning. It requires communication through technologies as well as a special institutional organisation [1]. E-learning on the other hand is defined as "anything delivered, enabled, or mediated by electronic technology for an explicit purpose of learning" [2].

Well-designed course content, teacher-student interactions that motivate the latter, well-prepared teachers who utilize varied online teaching tools, access to advanced technologies, and creation of a sense of an online learning community are a few of the factors that determine the effectiveness of online education [1]. In fact, these factors are contained within the eight pedagogical practices identified for a highly effective online teaching experience: fostering relationships, engagement, timeliness, communication, organisation, technologies, flexibility, and high expectations [1]. Further, reducing the time and cost of travel, increasing opportunities to access and collaborate with global-level experts, providing students with the flexibility to access courses at their convenience, and allowing adjustments to subjects and content are some other advantages of online education [1]. Hence, online education provides greater access to education than the traditional in-person method as it provides freedom for learners to study from anywhere, any time. Online education therefore is defined as “learning experiences in synchronous or asynchronous environments using different devices with internet access” [3]. It is computer or phone-based instructions, accessed over the internet, outside a traditional classroom learning environment [4]. Students can be anywhere to learn and interact with teachers and other students [3].

Online learning systems are seen as an enabler of in-person learning, not a replacement [5]. Despite so, at the university level, there are instances of fully online courses - but these are usually non-degree courses such as certificate courses. Blended/hybrid courses[1] are far more common in the arena of online education, which are seen more in developed rather than in developing countries [6]. Hence, learning management systems have become a part of the higher education teaching-learning process, worldwide.

Online education in Sri Lanka

Though online education have existed for over a decade, like most lower middle income countries, Sri Lanka had not utilised these to a great extent [5]. Instead, a preference for traditional in-person educational activities were seen until the start of the global pandemic in 2020, where teaching-learning activities were disrupted in many institutions. At the directive of the Sri Lankan government, in-person classes were halted at all educational institutions from March 2020 onwards, in order to ensure the safety of students, staff members and other stakeholders. Instead, the alternative of online education was selected to complete the prescribed syllabi. Hence, existing Moodle-based learning management systems within the university web servers were used, and the Lanka Education and Research Network was connected to university web servers and used for online education. Blackboard, Microsoft teams, Zoom, and other such platforms were used for online teaching-learning purposes.

One of the factors that ensure success of online education is the effectiveness of its delivery. Therefore, trained staff is essential. This is a significant challenge, particularly in countries such as Sri Lanka, where most university academics are not well-versed in online education. Cost of delivery [2, 6] and the quality of the internet connection are other key factors to consider when adapting an online learning system. As a solution for these concerns, whilst universities in Sri Lanka held training programs for academics to familiarize themselves with online teaching methods, many local internet service providers provided free long-term access to university web servers during the COVID-19 pandemic [5].

In the context of online education, the availability of laptops and affordable high speed uninterrupted internet connections were some of the key factors identified for ensuring equal access to university education in Sri Lanka [5]. Hence, despite online education having advantages such as access to learning regardless of location and time, it is not without disadvantages. In fact, in Sri Lanka, most students, especially those from lower- to middle-income families, have reported many barriers to continuing [5] through online means due to lack-of/poor internet connection, insufficient skill in managing online education, and unavailability of suitable devices.

Studies on online teaching experiences are scarcely reported from lower middle income countries. For instance, in Sri Lanka, there has been only one recent countrywide survey, which suggested that the education system require curriculum revisits, pedagogies, and assessments for more online education [5]. The current pandemic provides a unique opportunity to evaluate student perceptions on online education - this is particularly relevant because the pandemics' impact on education could continue indefinitely and hence, the online education milieu would require constant upgrading to facilitate the learning process. Within this context, this study aimed to fill a research gap by exploring physiotherapy students': (i) perceptions, (ii) perceived advantages, (iii) perceived drawbacks, and (iv) perceived barriers on their online teaching-learning activities. It is envisaged that the study results would facilitate a far more effective delivery of online education for physiotherapy degree programmes and for other degrees too. And, that the study results would be helpful to formulate online education in physiotherapy in the future, in a non-pandemic context too.

Methods

Sample

All three universities in Sri Lanka that offer a physiotherapy undergraduate degree programme was included in the study. Participants were from the second, third and fourth/final years of study whilst first years' were excluded as they lacked clinical exposure. The population size was 301.

Date collection and instruments used

A detailed literature review helped design a 49 item questionnaire that encompassed the study objectives. For instance, the students' perception of online learning was assessed through Students' Perception of Online Learning During the COVID 19 Pandemic Questionnaire [7] and Perceptions of Medical Students towards Online Teaching during the COVID-19 Pandemic [8] questionnaire. Students' level of satisfaction of the online learning system were assessed using questions from the Analysis of Learner Satisfaction and Needs on E-Learning Systems [9]. Students' preference to continue online learning in the future was assessed using selected questions from a questionnaire used in a previous study which assessed students' opinions on e-learning [10]. The role of online learning in clinical teaching, research and practice, and barriers to online learning was assessed through questions from the Perceptions of Medical Students Towards Online Teaching during the Pandemic questionnaire [8].

Data was collected online through a survey link (Google form) which had an information sheet and a consent form. The information sheet provided details about the study, including the study's purpose, duration, voluntary participation, reimbursement, and confidentiality. In order to ensure that participants have given their consent to participate in this study, they had to complete the consent form to access the study questionnaire. The survey link was sent to participants by senior management assistants or student representatives, through email, Whatsapp, or Messenger.

Statistical analysis

Data analysis was performed using SPSS. The patterns of responses were analysed using descriptive analysis. Cross tabulation was performed to determine the factors that influence future preferences in teaching methods.

Ethical approval of the study

The ethical approval for this study was obtained from the Ethical Review Committee of the Faculty of Medicine, University of Colombo. After obtaining such approval, permission was obtained from the Deans of three faculties in which the degree was placed in, and the Heads of the Physiotherapy departments.

Results

Demographics

The study response rate was 49%. Of the 147 responses obtained, 72% were female and 50% of the participants were from the 3rd year of study (see Table 1). 78% of the participants reported spending less than 10 hours on online learning per week before the pandemic and the remaining participants reported spending 10–40 hours or more than 40 hours per week (see Table 1). However, whilst during the pandemic, 63% indicated that they spent between 10–40 hours per week on online learning and the remaining participants reported spending less than 10 hours or more than 40 hours per week. 46 % of the participants had used video tutorials as their main online learning technique before the pandemic (see Table 1). 53% of the participants mentioned that delivering live lectures and tutorials via zoom or similar methods were adapted by their universities during the pandemic. Pre-recorded tutorials via university-specific online learning platforms, online question banks, and video tutorials were some other responses reported by 47% of the participants.

Table 1 summarises the descriptive details on effective online learning methods, interactivenss of classes, factors that influence class interaction, advantages, disadvantages and barriers for online learning, role of online learning in clinical teaching and practical classes, suitability of online learning for courses that require practical demonstrations, and future preferences for online learning. Whilst 48% of the participants mentioned that online classes were interactive 58% had identified that live tutorials via zoom or similar methods were effective in online education. It appears that opportunity to interact via

speech often makes online classes interactive. Breakout rooms was also indicated as a factor that makes online classes interactive.

Though 25% of participants indicated that the opportunity to stay at home is an advantage of online learning, 28% indicated that reduced interactions with teachers was one of its disadvantages. Further, 27% indicated that the lack of interactions with patients is a disadvantage of online learning whilst 36% indicated that a poor internet connection is one of the barriers for online learning.

Table 1
Descriptive details

Basic description	Details	N	%	Basic description	Details	N	%
University	University A	33	22	Disadvantages of Online learning	Reduced interaction with the teacher	99	28
	University B	83	56		Lack of interactions with patients	93	27
	University C	31	21		Poor learning conditions at home	59	17
Year	2nd year	22	15	Barriers for online learning	Lack of self-discipline	46	13
	3rd year	74	50		Social isolation	51	15
	4th/Final year	51	35		Internet connection	137	36
Gender	Female	106	72		Timing of tutorials	49	13
	Male	41	28		Family distractions	83	22
Level of IT skills	High	23	16		Lack of space	24	6
	Low	9	6		Lack of devices	46	12
	Moderate	115	78		Anxiety	37	10
Devices used for online learning	Desktop	2	1	Are these online teaching sessions interactive?	other	3	1
	Laptop	70	48		Majority are not	34	23
	Mobile phone	75	51		No Majority are	43	29
Own device	No	3	2	Factors make online class interactive	Yes	70	48
	Yes	144	98		Opportunity to interact via chat box	68	30

Basic description	Details	N	%	Basic description	Details	N	%	
Prior to pandemic online learning hours	Less than 10 hours/week	115	78		Opportunity to interact via speech	113	50	
	10–40 hours/week	29	20		Live quiz	41	18	
	More than 40 hours/week	3	2		Other	3	1	
During Pandemic online learning hours	Less than 10 hours/week	45	31	Online learning has successfully replaced the practical clinical skills through online learning	No	116	79	
	10–40 hours/week	93	63		Not applicable	19	13	
	More than 40 hours/week	9	6		Yes	2	1	
Prior to pandemic types of online learning platforms used for education purposes	Video tutorials e.g Youtube	100	46	Online learning has successfully replaced the clinical teaching you receive from direct patient contact?	Yes, to some extent	10	7	
	Live tutorials via zoom/ similar platforms	33	15		No	115	78	
	Online questions banks	23	11		Not applicable	19	13	
	Online/digital flashcards	9	4		Yes	1	1	
	Pre-recorded tutorials via school specific online learning platform	26	12		Yes, to some extent	12	8	
	None	25	11		Online learning is suitable for courses that need practical demonstrations.	Agree	70	48
	Other	2	1			Disagree	13	9
How universities adapted the online learning	Introduced a new learning platform with new resources	38	15		Strongly agree	42	29	
	Introduced new resources to an existing learning platform	24	10		Strongly disagree	6	4	
	Delivered live lectures/tutorials	133	53		Undecided	16	11	

Basic description	Details	N	%	Basic description	Details	N	%
	via zoom/similar platforms			Future online preference	I am comfortable with the fully in-person learning than online learning	31	21
	Delivered pre-recorded lectures/tutorials	55	22		I like combination of online learning and in-person learning (hybrid learning)	113	77
					I prefer fully-online learning to in-person learning	3	2
Advantages of Online learning	Access to online materials	77	16	Effective online teaching method	Live tutorials via zoom/similar platforms	85	58
	Learning on your own pace	102	21		Pre-recorded tutorials via school specific online learning platform	13	9
	Ability to stay at home	119	25		Online questions banks	2	1
	Classes' interactivity	14	3		Video tutorials e.g Youtube	37	25
	Ability to record a meeting	95	20		Other	1	1
	Comfortable surrounding	78	16		None	9	6

Table 2 provides details on students' perception of online learning, the level of satisfaction on the present online learning system, and a comparison of in-person learning and online learning experiences. The mean value (and standard deviation) was calculated for each criteria.

Table 2

Descriptive statistics on students' perception, satisfaction of present online system and comparison between online and in-person learning.

Student perception of online learning (1- strongly disagree, 5 = strongly agree)	Mean (SD)	Satisfaction levels on present e-learning systems Descriptive Statistics Rating (1•Always 2• Often 3• Sometimes 4• Rarely 5• Never)	Mean (SD)	Comparison between in-person learning and online learning (1-extremely ineffective, 5-extremely effective)	Mean (SD)
The teaching is often stimulating	3.25 (0.76)	Are you able to use the technology and internet including web browsing for your learning with ease?	2.83 (0.81)	Effectiveness of online learning in terms of increasing knowledge	3.52 (0.77)
I find it easy to engage in the lesson	3.21 (0.85)	Is the e-learning system or LMS used by you useful to fulfil your learning needs?	3.8 (0.89)	Effectiveness of online learning in terms of increasing clinical skills	1.97 (0.84)
I feel able to ask the questions I want	3.59 (0.87)	Is the e-learning system used by you organized to satisfy your learning objectives?	3.59 (0.85)	Effectiveness of traditional in-person learning in terms of increasing knowledge	3.67 (0.82)
I enjoy the online teaching	3.03 (0.92)	Is it easy for you to understand the features of the e-learning system or LMS that you have used?	3.75 (0.91)	Effectiveness of online learning in terms of increasing social competences	2.49 (0.88)
I would like the online teaching to be more interactive	3.41 (0.91)	Is the e-learning system used by you providing you with the precise course content that you are looking for?	3.5 (0.92)	Effectiveness of traditional in-person learning in terms of increasing clinical skills	3.93 (1.17)
I feel that online teaching is as effective as in-person teaching	2.68 (1.03)				
I prefer online teaching to in-person teaching	2.83 (1.05)	Is the e-learning system used by you providing you with flexibility to navigate among learning resources to control your individual learning speed?	3.47 (0.89)	Effectiveness of traditional in-person learning in terms of increasing social competences	3.79 (1.04)

Student perception of online learning (1- strongly disagree, 5 = strongly agree)	Mean (SD)	Satisfaction levels on present e-learning systems Descriptive Statistics Rating (1•Always 2• Often 3• Sometimes 4• Rarely 5• Never)	Mean (SD)	Comparison between in-person learning and online learning (1-extremely ineffective, 5-extremely effective)	Mean (SD)
The teachers are well prepared for the teaching sessions	3.58 (0.83)				
I feel I am being well prepared for my profession	2.93 (0.86)	Is the design and user interface of the e-learning system used by you attractive and customizable?	3.43 (0.91)	Describe your activity during online learning	3.54 (1.04)
My internet connection can be problematic	3.65 (0.98)			Describe your activity during traditional in-person learning	2.03 (1.03)

LMS- Learning management system

The factors that influence future learning preferences were assessed where factors such as study year, gender, internet connection, learning effectiveness between in-person learning and online learning, level of interaction between students and lecturer during in-person and online learning, nature of stimulating learning systems during in-person and online classes, ways of engaging students for learning activities between in-person and online learning, options to ask a question during classes, preparing for future professional tasks expected to perform as a physiotherapist, and, effectiveness of the learning management system used by the university were assessed. Table 3 provides a summary of these results.

Table 3
Factors influencing preferred future learning method

P Value	Factors	Your preferred method		P Value	Factors	Your preferred method	
		Fully in-person	Hybrid method			Fully in-person	Hybrid method
Year in the university * your preference P > 0.05	2nd year	14%	86%	Online method is Engaging * Preferred method P < 0.05	Not engaging	52%	48%
	3rd year	22%	78%		Neutral	22%	78%
	4th/Final year	24%	76%		Engaging	7%	93%
	Total %	22%	79%		Total	22%	79%
Gender * preferred method P > 0.05	Female	20%	80%	Ask questions * Preferred method p > 0.05	Not satisfied	17%	83%
	Male	25%	75%		Neutral	26%	74%
	Total %	22%	79%		Satisfied	20%	80%
Internet connection * Preferred method P > 0.05	No internet connection problem	18%	82%	Preparing for a profession * preferred method p > 0.05	Total	22%	79%
	Neutral	23%	77%		Not agree	31%	69%
	Yes internet connection was a problem	22%	78%		Neutral	20%	80%
	Total %	22%	79%		Prepare for a profession	13%	87%
Effectiveness of online * Preferred learning method P < 0.05	Not effective	41%	59%	LMS usefulness * preferred method p > 0.05	Total	22%	79%
	Neutral	6%	94%		LMS Not useful	36%	63.60%
	Effective	3%	97%		Sometimes	22%	78%
	Total	22%	79%		LMS useful	20%	80%
Interactive * Preferred methods P < 0.05	No	29%	71%	LMS content and preferred	Total	22%	79%
	Yes	13%	87%		Content is not organized	44%	56%
	Total	22%	79%				
Online learning	Not stimulating	50%	50%				

stimulating* preferred methods P < 0.05	Neutral	21%	80%	method p > 0.05	Sometimes	19%	81%
	Stimulating	13%	87%		Content organized	19%	81%
	Total	22%	79%		Total	22%	79%

Discussion

Online education was not common in Sri Lanka until the COVID-19 pandemic, where, out of necessity, many universities adapted online teaching-learning activities, including institutions with undergraduate physiotherapy degree programmes. This study's main objective was to explore the experience of online learning among physiotherapy undergraduates during the COVID-19 pandemic.

The study results indicate a significant increase in time spent on online learning during the pandemic and the most prominent reason for this result maybe that the universities had adapted to delivering online lectures (e.g. 53% of the participants mentioned Zoom or similar platforms). These results are similar to a study conducted in the United Kingdom [8]. Hence, it appears that, despite the economic ranking of a country, the pandemic, which caused limited choices to continue higher education, led to a rapid transition of higher education to an online provision in both developing and developed countries [11].

Equipment readiness is having a device and high technological readiness for online learning [4]. According to this study, 98% of participants owned a device to attend online classes where 51% had a mobile phone or 48% had a laptop. However, about 62% of the participants indicated that they had internet connection problems during classes. These result are similar to studies conducted in other Asian countries [4, 12], Poland [7] and the United Kingdom [8]. In fact, studies conducted in both Malaysia and Thailand on student readiness for online learning indicated that the highest indicator was obtained for equipment readiness [4]. With regards to participant information technology skills, our study results indicated that 78% have a moderate level of skill, a finding similar to a study conducted among Malaysian physiotherapy undergraduates [4]. Hence, though Sri Lanka is deemed a lower middle income country, its undergraduates' information technology skills appear to be in par with more developed countries such as Malaysia, which may possibly be due to exposure to information technology skill training at schools in Sri Lanka. In fact, in 2002, the National Policy on Information Technology in School Education was introduced in Sri Lanka [13] which may have led to these results. It is recommended to have an introductory session on information technology and different online teaching-learning platforms as a part of the first-year university curriculum which may further enhance the knowledge related to online learning and related platforms.

In this study, 46% of the participants indicated that video tutorials had been used before the COVID-19 pandemic as an online learning tool. Most of the participants from a study in the United Kingdom too mentioned that they had used YouTube as an online learning method before the pandemic [8]. The reasons for the similarity in these results maybe that videos make education interesting, engaging, easy

and conceptual [14]. Therefore, students appear to use these additional learning tools in both developing and developed countries.

In this study, though 25% of the participants indicated being able to be at home as an advantages of online learning, 28% indicated that technical problems (e.g. unstable internet connectivity, power failures, using different online education systems such as zoom) are one of the barriers to such learning. In Sri Lanka, only three universities offer physiotherapy degree programmes, and students from many parts of the country attend these programmes, whilst staying at hostels, away from home. This is a challenging situation for many students, including the added financial expense of staying away from home. Online education has given them an opportunity to stay at home and learn at their own pace. Yet, technical facilities such as internet connectivity might not be good in rural areas as it is in the cities. Therefore, when students access online classes from their home environment, especially in rural areas, there is a higher possibility of technical problems. Therefore, solutions to this factor should be considered when delivering online teaching or distance learning programmes in the future.

Active learning should be used for teaching-learning activities. The students' engagement will be high in an active learning process. This can be achieved through interactive sessions during online classes which encourage students' critical thinking. According to the study results, most participants (58%) indicated that online classes through live tutorials via zoom or a similar platform are effective compared to other methods (such as pre-recorded lectures, online question banks) because there is a possibility for student-teacher interaction. Also, 50% of the participants mentioned the opportunity to interact via speech as one of the factors for interactive sessions. However, a higher mean score was obtained for the criteria "I would like the online teaching to be more interactive". This result is similar to a study conducted in the United Kingdom [8]. These indicate that lecturers should utilise different teaching strategies to make online classes more interactive. It is recommended that lecturers include small group discussions, online case simulations and quizzes to increase students' engagement and interaction during online classes.

In this study, the perceived effectiveness of online learning versus in-person learning, in terms of increases in knowledge, clinical skills, and social competence were compared. A higher mean score was obtained for in-person learning compared to online learning in all of these domains. Nearly 78% of the participants mentioned that online classes cannot replace learning experience of practical classes or clinical training. A possible explanation for this might be that during in-person learning, students have opportunities for peer-to-peer interactions, group discussions, patient interactions, to learn from practical demonstrations by teachers, and to get live feedback during practical classes from teachers - this is of course other than live learning of the various clinical conditions. These factors contribute for social competence too. Social competence is defined as the ability to handle social interactions effectively [15]. However, it is not possible to have most of these factors in virtual classrooms. Similar findings were reported in studies conducted in other countries as well [7, 8].

According to the study results, 79% of the participants mentioned that online classes could not replace practical classes' learning experience. Video demonstrations are commonly used for practical skill

demonstration during online classes in Sri Lanka for physiotherapy programmes in pre-COVID time. However, in an in-person practical class, Peyton's teaching approach is often used for skills acquisition in health professions' education [16]. This approach includes four main steps: demonstration, deconstruction, comprehension, and performance [16]. These steps include the teacher conducting a demonstration, without describing it verbally, of a particular technique, then repeats the steps of the technique; during this step, a teacher describes all necessary sub-steps (deconstruction) of the technique, and finally, a student explains each sub-step of the technique while the teacher follows the student's instructions (comprehension). Physiotherapy practical classes are mainly focused on hands-on skill training. The students should be able to demonstrate those skills by themselves at the end of the class. This is hardly possible to achieve through virtual classes. Further, performing a live video demonstration by a teacher in a virtual class requires many infrastructure facilities and resources. This might not be readily available for every teacher. Therefore, this factor should be considered in a practical based course such as physiotherapy when its instructions are done via online education. Similarly, 78% of the participants mentioned that online classes did not replace clinical-based teaching. In a clinical setup, the traditional approach of Halsted's teaching approach [17], "see one-do one" is often used for clinical teaching in Sri Lanka. In this approach, the teacher demonstrates and describes a procedure, and afterwards, the students practice the procedure [16]. This approach cannot be done in virtual classes. Tele-rehabilitation is used to provide clinical services for patients who need physiotherapy in some developed countries during the pandemic. In Sri Lanka, tele-rehabilitation is not widely available. There are many reasons such as technical issues, lack of knowledge among people to use tele-rehabilitation, lack of facilities in hospitals to deliver tele-rehabilitation for patients, etc. Therefore, it is not possible to arrange clinical classes using this virtual option during a pandemic in Sri Lanka. This might be the possible reason that online classes did not replace clinical-based teaching during the pandemic in Sri Lanka.

With regards to the future, the results indicate that most students prefer a hybrid teaching-learning method. Students indicated that they preferred to stay in the comfort of their home when learning theoretical parts which also has a financial saving for them. But they did indicate that for practical and clinical sessions, in-person teaching would be the best because skills acquisition is best in such a context of patient, peer and teacher interactions. Despite this preference for a certain component of online learning in the future, the students did have some reservation about it, such as the difficulty to concentrate constantly for hours in front of a screen, poor internet connection, lack of devices necessary for learning, family distractions, social isolation, and difficulty to study whilst always being at home.

The factors that influence the future learning preferences among physiotherapy undergraduates were assessed too. Participants were likely to select a preferred learning method based on the following factors: learning effectiveness, interactive classes, a stimulating learning system, an engaging learning system, provision to prepare for future professional tasks, and the effectiveness of the learning management system. On the other hand, the following factors were less likely to be associated with a future preferred learning method: study year, gender, internet connection, and options to ask questions. The Ranganathan et al. s' results [4] indicated that gender did not influence online readiness too. The

present study results indicated that students choose a future preferred learning method based on the effectiveness of online sessions in making them active learners and critical thinkers, not based on external barriers such as internet issues. Active learning include an interactive approach to education and training designed to engage learners as they strive to acquire and understand knowledge, [18].

Conclusions

This study describes the experience of online learning among physiotherapy undergraduates in a lower middle income country, Sri Lanka. One of the strengths of this study is that it represents all three universities that offer a physiotherapy undergraduate degree programme, hence, the results are generalizable. However, this study is not without limitations. For instance, the study questionnaire could have been assessed for its psychometric properties of validity and reliability, which could not be done due to time constraints. It is recommended to have a more in-depth, qualitative analysis to further identify the impact of COVID-19 on physiotherapy undergraduates' use of online teaching. Further, in this study, only students' perceptions and satisfaction was assessed. In the future, physiotherapy lecturers' perceptions and satisfactions with regards to online teaching could be assessed too which could give a more holistic picture. The study results indicate that there are both positive and negative aspects of online education. Results indicate that some problems, such as internet issues, should be addressed to provide a satisfactory learning experience to students. However, this issue less likely to influence the future learning preference. A hybrid teaching method would be ideal for a programme that requires practical classes and clinical placements. The online teaching-learning activities should be prepared to stimulate students' interest in learning, provide an interactive environment, and engage them to provide an active learning environment.

Declarations

Ethics approval and consent to participate: Ethical approval for this study was obtained from the Ethical Review Committee, Faculty of Medicine, University of Colombo. The written consent was obtained from the participants.

All methods were performed in accordance with the relevant guidelines and regulations.

Consent for publication: Not applicable

Availability of data and materials: All the data will be provided on request.

Competing interests: There are no competing interests.

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All authors have read and approved the manuscript.

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