



Perceptions and Preferences of Pharmacy Students Towards Classroom Based Versus Online Teaching-Learning and Assessment: A Survey During Covid Pandemic

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Abstract: This study aimed to assess the perception and the preferences of undergraduate pharmacy students towards traditional classroom-based versus online teaching-learning and assessment during the COVID-19 pandemic. A standardized questionnaire was developed, statistically validated and administered to a total of 531 students pursuing Pharm. D or B. Pharm in the Pharmacy college of a deemed university through mail and WhatsApp as google forms. The completed responses obtained from 454 students were analyzed for their preferences and perceptions towards both methods of teaching-learning and assessments. The significant differences in the responses between students of both programs were assessed using unpaired sample t-test. There were 288 (64%) responses from B. Pharm and 166 (36%) from Pharm. D students. The difference in year of study (i.e. duration of the program), age and number of courses between the two programs were highly significant. Majority of the students stated classroom-based teaching as more advantageous (42.6%). Easy access to the teaching material (51.4%) and lack of personal contact with the teacher (40.2%) were considered as major advantage and disadvantage to online teaching-learning respectively. 54.1% of students opted for online and 46.9% chose traditional classroom teaching for interest generation towards learning. Majority of the students in both programs (43% and 53% respectively) preferred both classroom-based and online teaching-learning to enhance their knowledge, skills and self-directed learning. Similarly, the preferences for assessments were higher for conventional mode of in-person written examinations (71.2%) and remote online assessments (29.8%) through multiple choice questions, assignments etc. Thus students' perception towards an in depth understanding of the concepts was in favour of traditional classroom based teaching learning, whereas interest towards learning and accessibility to study materials were in favour of online teaching learning. Most of the students preferred learning through blended mode rather than being exposed to either one of the teaching-learning techniques. However, there was a higher preference for conventional in-person mode than the online mode of assessments. Academic dishonesty, technological inconsistency and incompetency were identified as major bottlenecks for remote online assessments.

Keywords: Classroom-based teaching, online teaching, Perception, Preference, Assessment, Pharmacy students.

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Received On 2 February, 2022

Revised On 19 May, 2022

Accepted On 24 May, 2022

Published On 1 July, 2022

Funding This research did not receive any specific grant from any funding agencies in the public, commercial or not for profit sectors.

Citation Chandini Ravikumar , Shabna Roupal Morais , Vanitha Rani Nagasubramanian , Perceptions and Preferences of Pharmacy Students Towards Classroom Based Versus Online Teaching-Learning and Assessment: A Survey During Covid Pandemic.(2022).Int. J. Life Sci. Pharma Res.12(4), P16-25 <http://dx.doi.org/10.22376/ijpbs/lpr.2022.12.4.P16-25>

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Int J Life Sci Pharma Res., Volume12., No 4 (July) 2022, pp P16-25

I. INTRODUCTION

Today, in the 21st-century “understanding” is more important than other process in education. An efficient medium to deliver and instill knowledge or information is through education. Education serves as an engine for the development and improvement of any society and India is no exception. India, being a home for more than 130 billion people, education is a fundamental right for every child which cannot be denied at any cost ¹. The most ancient and formal method of teaching which involves a direct flow of information from the teacher as sage to a student as a receptacle is termed as the traditional pedagogy approach of teaching and learning. Even today, the traditional role of teaching focuses on the teacher as organizers of learning activity, providers of information and experts of knowledge. The teacher carries the responsibility of teaching and making the students understand the concept of what is being taught, in other words, there is a typical way to control the class where the teacher teaches using blackboard, explains the concepts, asks the students to copy and make notes ensuring that, the students are paying attention. The world is technically updating itself every single second similar software updation. With the discovery of the mobile phone, smart phone and the most revolutionizing discovery of all time, the internet has shrunk the entire world and brought right in between our hands. The combination of smart phones with internet access has replaced newspapers with news update notifications, printed books with PDFs etc. This “upgrade” has impacted the pedagogy as well; in fact, technology has proved to mark changes in the teaching-learning process; it has transformed the learner from being passive into an active participant ². The outbreak of the coronavirus has brought about a huge change in almost every individual in all aspects of life. COVID-19 has presented a novel pedagogical challenge in dealing with the sudden shift from classic instruction to emergency remote teaching. Higher education was forced to make abrupt changes in a few days, fully transitioning curricula from face-to-face to distance education. The only mode of delivering education has been shifted to online ³. Also assessments were made online using learning management systems like MOODLE, Google classroom, online quizzing tools like Kahoot, GOSOAP BOX etc. In a country like India where traditional pedagogy is the major mode of delivering knowledge, this has become a new challenge for both teachers and learners. Owing to the pandemic, teachers are in need of providing information to students remotely and performing all teaching roles online. Current technological advances are helping the formal education sector to develop new delivery modes and assessment techniques that can meet, at low cost, the demand for continuing education ⁴. Pharmacy programs are skill-based and entail more experimental learning. Delivering the entire pharmacy curricula online is a challenging task for the faculty. Also assessment of knowledge through online mode via viva-voce, through assignments, quizzes etc. are feasible, but both pharmacy programs being a technical/clinical skill based delivery of practical skills and its assessment through online is unwieldy. Though today's students are more techno-savvy and are comfortable with technology, skill-based learning and assessment through online is really perplexing for learners and the teachers. Despite growing evidences claiming that online learning is as effective as traditional means of learning, there is very limited evidence available about what works, and when and how online learning enhances teaching-learning and assessment of

the pharmacy curricula ⁵. Hence there is a need for evaluating the perception and preference of the pharmacy students as to which helps them better in gaining knowledge, engaging them more in teaching-learning, accessibility to study material and assessment of their knowledge and skills from their perspective. This study was done to assess the perception and the preferences of pharmacy students towards traditional classroom-based versus online teaching-learning and assessment by developing and standardising a student-centred survey questionnaire as a tool for the study.

2. MATERIALS AND METHODS

This was a cross-sectional study done to assess the preferences and perception of the pharmacy students towards the conventional classroom-based versus online teaching-learning and assessment methods undergone by them during the COVID-19 pandemic. The study was conducted using a self-developed structured questionnaire as a survey tool.

Study design

The study was conducted from April to June 2021 during the lockdown period. The study population was selected by snowball sampling method after obtaining the approval of the Institutional Ethics Committee.

Study sample and settings

The study population included 361 B. Pharmacy students (B. Pharm I- 100, B. Pharm II year -100, B. Pharm III year – 101 and B. Pharm IV year - 60) and 170 Pharm. D. students (Pharm. D. I year to V year - 30 students/year; Pharm D (Post Baccalaureate) I and II year students -10 students per year) studying in a Pharmacy college in South India. Students of respective year and course who are willing to participate in the study and have completed the questionnaire were included. Unwilling and non-responsive students were excluded from the study. The students were undergoing their theory and practical classes through online mode during the period of study due to the lockdown following the COVID-19 pandemic. Formative and summative assessments were also made through online mode as multiple choice questions through learning management system and tools like GOSOAPBOX and QUIZZIZ, assignments and viva-voce.

Study tool design

A questionnaire consisting of 30 questions was prepared exclusively for the study after a thorough review of the literature ^{6,7}. The questionnaire consisted of three parts; Part A consisted of 5 questions to obtain the baseline characteristics including the demographic data of the students. Part B consisted of 13 questions (6-18), of which questions 6 to 15 assessed the perceptions of the students towards the traditional and versus teaching-learning; questions 16 to 18 assessed students' perceptions about conventional written exams versus online mode of assessments. Questions 6 to 10 had four choices as responses and questions 11 to 18 had responses to be given as agree, strongly agree, neutral, disagree and strongly disagree. Part C consisted of 12 questions with three responses for each, of which questions 19 to 28 assessed the students' preferences of traditional versus online teaching-learning; questions 29 and 30 assessed the students'

preferences for conventional versus online mode of proctored assessments and their apprehension towards online mode of assessment. This questionnaire was distributed to a total of 531 students through E-mail and WhatsApp as Google forms and responses were collected. The questionnaire was given to three experts to assess for its item to total correlation and reliability. The responses were analysed statistically using Cohen's kappa to validate its correlation to the study objectives and its reliability. A kappa value of 1.000 was obtained with an approximate significance of $P=0.001$, indicating a perfect agreement for its correlation and its inter and intra-rater reliability.

3. STATISTICAL ANALYSIS

The collected data were analyzed with IBM.SPSS statistics software 23.0 version. The categorical variables were

expressed in descriptive statistics as frequency and percentage analysis and the continuous variables were expressed as mean & standard deviation (SD). The significant differences between the perceptions and preferences of B. Pharm and the Pharm. D students were assessed using chi-square test considering the probability value of <0.05 as significant level.

4. RESULTS

4.1 Participants' Demographics

A total of 454 responses were obtained out of the 531 students who received the questionnaire in google forms, of which 288 (64%) were in B. Pharm and 166 (36%) were in the Pharm. D programs.

Table 1: Participants' demographics

S. No	Demographics	Category	Total No. of Respondents (N=454)			
			B. Pharm (n = 288)		Pharm. D (n=166)	
			n	%	n	%
1	Gender	Female	151	52.4	99	59.6
		Male	137	47.6	67	40.4
2	Year of Study	I Year	71	24.7	28	16.9
		II year	88	30.6	29	17.5
		III Year	77	26.7	29	17.5
		IV Year	52	18.1	30	18.1
		V Year	-	-	30	18.1
		Post Baccalaureate I year	-	-	10	6.0
		Post Baccalaureate II year	-	-	10	6.0
3	Mean Age $\pm$ SD (Years)		19.68 $\pm$ 1.504		20.75 $\pm$ 1.815	
4	Average no. of Courses/year		10 $\pm$ 1.0		5 $\pm$ 1.0	
	Theory Practical		6 $\pm$ 3.0		4 $\pm$ 1.0	
5.	Which of the following online tools were you exposed to most commonly in your teaching-learning and assessment process?	Tools	n			
		Search engine (Wikipedia, Google)	223			
		YouTube	206			
		Kahoot/Quizziz	236			
		Khan academy	40			
		MOODLE	450			
		Google classroom	256			

**** $P < 0.01$ – Highly significant**

The demographics of the study population were explained in Table 1. The students were in the age range of 17 to 26 years with a mean age of 20.07 ± 1.70 years. The mean age of the B. Pharm students was 19.68 ± 1.50 years and that of the Pharm. D students was 20.75 ± 1.82 years. Of the 292 B. Pharm students, 151 (52.4%) were females and 137 (47.6%) were males and of the 166 Pharm. D students 99 were females (59.6%) and 67 (40.4%) were males. When asked

about the ICT tools, most commonly known to them, 223 (49%) responses were for the Google search engine, 206 (45%) responses were for YouTube, 236 (52%) responses were for online assessment tools like Kahoot and quizziz, 450 (99%) were using Learning management system (LMS) called MOODLE and 256 (56.4%) were aware of google classroom.

4.2 Analysis of survey questions

Table 2: Students' Perception related Responses (Questions 6 to 10)

Q. No.	Question	Category	No. of Responses (N=454)	
			n	%
6	Which mode do you prefer to get the information needed for your learning?	search the internet	302	67
		read the text books	243	54
		discussing with my peers	142	31
		ask the teacher	138	13
7	Which of the following do you think are the advantages of online teaching?	easy access to the teaching material	380	84
		presence of teacher is not necessary	205	45
		flexible time and place of studying	273	60
		all the above	155	34
8	Which of the following do you think are the disadvantages of online teaching?	lack of personal contact with the teacher	310	68
		problems with technology	239	53
		absence of emotions which need to be vented	216	48
		all the above	154	34
9	Which of the following do you think are the advantages of traditional classroom-based teaching?	direct flow of information from the teacher to the student	167	37
		active communication between the student and the teacher	162	36
		classes are scheduled and properly carried out	148	33
		all the above	194	43
10	Which of the following do you think are the disadvantages of traditional classroom-based teaching?	concentrated on theoretical method rather than practical aspects	146	32
		less activities in the classroom	138	30
		the teacher is the only individual who talks and gives command	139	31
		all the above	139	31

Table 2, explains the responses obtained from the students for the 5 questions (6 to 10) of the questionnaire which assessed the students' perception about the advantages and disadvantages of traditional classroom-based and online teaching and learning. When asked about their preference to get the information needed for their learning, 67% students

opted for searching the internet. 84% students stated easy access to the teaching material as an advantage and 68% stated as lack of personal contact with the teacher as the disadvantage of online teaching. There was an equal distribution of responses for the advantages and disadvantages of classroom-based teaching.

Table 3: Students' perception related responses (Questions 11 to 15)

Q.NO	Question	Category	No. of Responses (N=454)		Significance P
			B. Pharm (n=288) n (%)	Pharm. D (n=166) n (%)	
11	ICT enabled online teaching gives more in depth understanding of concept	agree	124 (43.1)	70 (42.2)	0.164 (NS)
		disagree	20 (6.9)	8 (4.8)	
		neutral	104 (36.1)	68 (41.0)	
		strongly agree	20 (6.9)	16 (9.6)	
		strongly disagree	20 (6.9)	4 (2.4)	
12	Traditional teaching gives more in depth understanding of concept	agree	115 (39.9)	57 (34.3)	0.250 (NS)
		disagree	13 (4.5)	5 (3.0)	
		neutral	108 (37.5)	79 (47.6)	
		strongly agree	39 (13.5)	21 (12.7)	
		strongly disagree	13 (4.5)	4 (2.4)	
13	Rate the accessibility to the study material through ICT	1	4 (1.4)	1 (0.6)	0.277 (NS)
		2	10 (3.5)	3 (1.8)	
		3	84 (29.2)	48 (28.9)	
		4	128 (44.4)	88 (53.0)	
		5	62 (21.5)	26 (15.7)	

14	Rate the accessibility to the study material through traditional method (Books and Journals)	1	6 (2.1)	5 (3.0)	0.161 (NS)
		2	22 (7.6)	21 (12.7)	
		3	109 (37.8)	48 (28.9)	
		4	94 (32.6)	52 (31.2)	
		5	57 (19.8)	40 (24.1)	
15	Which creates more interest for learning?	Traditional classroom teaching	134 (46.5)	75 (45.2)	0.782 (NS)
		online teaching	154 (53.5)	91 (54.8)	
16	Which mode of assessment is more suited to measure the attainment of learning outcomes?	Conventional in-person assessment	170 (59.3)	98 (58.9)	0.678 (NS)
		Remote online assessment	118 (40.7)	68 (41.1)	
17	Which mode of assessment has more credibility?	Conventional in-person assessment	187 (65)	105 (63.3)	0.352 (NS)
		Remote online assessment	101 (35)	61 (36.7)	
18	Which mode of assessment has higher extent of academic dishonesty?	Conventional in-person assessment	110 (38)	68 (40.9)	0.232 (NS)
		Remote online assessment	178 (62)	98 (59.1)	

P > 0.05; NS – Non significant

The responses of the students for questions 11 to 18 are explained in Table 3. Questions 11 to 15 assessed the students' perception towards the role of online and traditional classroom-based teaching learning in the understanding of concepts, accessibility of study materials and interest generation. Questions 16 to 18 assessed the

perception of students towards conventional in-person written exams and remote online exams. The difference in the perception of students based on their program of study was also assessed indicating that there were no statistically significant differences in the responses of the B. Pharm and Pharm. D students for the questions 11 to 18 ($P > 0.05$).

Table 4: Students' preference towards online Vs traditional teaching

Q.NO.	QUESTION	Options	B. Pharm (n=288) n (%)	Pharm. D (n=166) n (%)	Significance P
19	This helps me to gain more knowledge related to the subject	online	58 (20.1)	45 (27.1)	0.057 (NS)
		traditional	85 (29.5)	30 (18.1)	
		both	145 (50.3)	91 (54.8)	
20	This helps me to develop skills related to the subject	online	122 (42.4)	72 (43.4)	0.952 (NS)
		traditional	66 (22.9)	36 (21.7)	
		both	100 (34.9)	58 (34.9)	
21	This facilitates me to exchange ideas with my teachers and friends	online	75 (26.0)	46 (27.7)	0.796 (NS)
		traditional	115 (39.9)	61 (36.7)	
		both	98 (34.0)	59 (35.5)	
22	This makes it easier for me to pass my courses (subjects)	online	115 (39.9)	62 (37.3)	0.854 (NS)
		traditional	58 (20.1)	34 (20.5)	
		both	115 (39.9)	70 (42.2)	
23	This helps me to complete my course assignments	online	120 (41.7)	85 (51.2)	0.05 (NS)
		traditional	64 (22.2)	17 (10.2)	
		both	104 (36.1)	64 (38.6)	
24	This helps me to resolve my doubts by myself	online	126 (43.8)	92 (55.4)	0.11 (NS)
		traditional	64 (22.2)	20 (12.0)	
		both	98 (34.0)	54 (32.5)	
25	This allows me to better communicate with my teacher	online	81 (28.1)	33 (19.9)	0.127 (NS)
		traditional	126 (43.8)	85 (51.2)	
		both	81 (28.1)	48 (28.9)	

26	This gives me knowledge to question my peers	online	104 (36.1)	72 (43.4)	0.057 (NS)
		traditional	68 (23.6)	23 (13.9)	
		both	116 (40.3)	71 (42.8)	
27	This helps me to learn and do my learning activities at my time	online	110 (38.2)	86 (51.8)	0.056 (NS)
		traditional	56 (19.4)	17 (10.2)	
		both	122 (42.4)	63 (38.0)	
28	This helps to enhance my overall understanding and allows me to learn at ease	online	96 (33.3)	55 (33.1)	0.054 (NS)
		traditional	67 (23.3)	23 (13.9)	
		both	125 (43.4)	88 (53.0)	
29	My preference towards my formative and summative assessments	In-person	208 (71.2)	115 (69.2)	0.51 (NS)
		online	80 (28.8)	51 (30.8)	
30	My apprehension towards online assessment	Academic dishonesty	210 (72.9)	124 (74.6)	0.152 (NS)
		Technology inconsistency	205 (71.1)	105 (63.2)	
		Technology incompetency	132 (45.8)	68 (40.9)	
		Pattern of assessment (as Multiple choice questions)	155 (53.8)	97 (58.4)	

$P > 0.05$; NS – Non significant

Table 4, explains the responses of the B. Pharm and Pharm. D students for questions 19 to 30. Questions 19 to 28 assessed their preferences of online, traditional or a blend of both for gaining knowledge, developing skills, exchange of ideas, completion of assignments, communicating with teachers and peers etc. Questions 29 and 30 assessed their preference towards proctored online and in-person mode of assessment and their apprehensions for online mode of assessment. There were no statistically significant differences in the responses of the B. Pharm and Pharm. D students for questions 19 to 30 ($P > 0.05$) indicating that the program of study had no relationship with their preferences towards online teaching- learning, traditional teaching-learning and mode of assessments.

5. DISCUSSION

The COVID-19 pandemic has led to substantial university closures, resulting in abrupt conversion of teaching-learning and assessment activities to virtual modalities in order to keep academic courses running while minimising crowding and the risk of infection spreading. This had affected millions of students and the teachers around the world. This study aimed at assessing the perception of the pharmacy students towards traditional classroom-based and online teaching and assessments. A self-developed validated questionnaire was sent via google forms to the pharmacy undergraduate students through email or Whatsapp. The response rate was found to be 86%. Pharmacy programs at undergraduate level are conducted as two programs in India, four years semester-based Bachelors in Pharmacy and six years non-semester Doctor of Pharmacy (an integrated program). The first four questions of the questionnaire assessed the baseline characteristics of the students. The significant differences in the mean age, number of courses between the B. Pharm and Pharm. D students were the reflection of the sanctioned intake of students which was 100 per batch for B. Pharm and

30 per batch for Pharm. D programs and the semester-based and year-wise pattern of curriculum respectively. Students were exposed to ICT tools like Kahoot and Quizziz (52%), Wikipedia (49%) and YouTube (45%) as they were used in the classroom. The perception of the students towards the traditional classroom-based and technology-driven online teaching was assessed through questions 6 to 15. 67% of students preferred internet sources for obtaining information needed for their learning and the reasons were immediate accessibility of the needed information in search engines like google and YouTube, self-learning through these resources at their own pace and time. However, 54% of students still preferred textbooks as a source of information. This also depicts that the majority of students prefer both textbooks and online content as the sources for the information. Students are to be encouraged to refer both the sources as the textbooks give an in depth understanding of the concepts to be learned and updated information on the same can be obtained through web resources. Ease of access to the learning material and self-paced learning were the commonly stated advantages of online teaching-learning. There were 45% of students who felt the lack of need for teachers' presence as an advantage but the same was also stated as a disadvantage of ICT (Information and communications technology) enabled online learning, with the reason that lack of personal contact with the teacher would result in poor understanding and lack of emotional connect with the teacher. Technical disturbance in online teaching-learning was also stated as a disadvantage; whereas these were identified as advantages of the traditional classroom-based teaching by the students. Active communication between the teacher and students, well scheduled and conducted classes, direct flow of information from the teacher were the reasons stated as advantages of traditional classroom based teaching. Similarly, lesser activities and more theoretical delivery were specified as disadvantages of traditional classroom-based teaching. Some students have also stated that

communications in face-to-face classes were often monologues by teachers. Most of the pharmacy subjects are skill-based and a sound understanding of the concepts is significant for the development of the skills. Classes that are blended with face-to-face sessions for an explanation of the theoretical concepts and emphasis of the same through virtual ICT tools could be more fruitful in training the students to develop core competencies. This is also reflected in the results of this study where an almost equal proportion of students opted for both ICT-enabled online (43%) and traditional teaching (38%) when questioned about their impact on the in-depth understanding of concepts. Similarly, equal ratings were given by the students when asked about the accessibility of the study material in both methods. The study identified that the interest created for learning among the students by the ICT-enabled online and the traditional teaching were almost the same with 54% and 48% of responses respectively, unlike other similar studies which reported a higher preference among students for online when compared to the traditional classroom based teaching - learning⁶⁻⁸. When questioned about their learning preferences for gaining more knowledge related to the subject, the majority of them preferred both ICT-enabled online and face-to-face methods, whereas for skill components, the majority of the responses were for ICT-enabled online teaching. When 39% of students stated that traditional classroom-based teaching-learning facilitated exchange of ideas with their peers, 41% stated that both online and traditional teaching-learning are needed to master the courses easily. Though the majority stated that traditional classroom-based learning facilitated them to communicate with their teachers and peers, ICT-based remote learning was chosen by the majority of the students for self-directed learning at their own pace and self-assess their competency levels. Also, majority of the students stated that they need both methods of learning to develop in-depth knowledge and good questioning skills. A study by Amir et al., demonstrated that 44.2% students in higher education preferred remote online learning over classroom learning. This study also reported that the preferences were influenced by the year of study⁹. In the present study, though there were no statistically significant differences in the perceptions and preferences of the students, the Pharm D students were inclined towards ICT-enabled online teaching-learning than the B. Pharm students. This could be attributed to the differences in the curriculum between these two programs. B. Pharm program with more focus on pharmaceuticals and pharmaceutical chemistry skills-based core courses, a traditional face-to-face approach of teaching would facilitate better learning of the theory and practical aspects of these courses. Pharm. D being a clinically oriented program with a stronger emphasis on pharmacology, pharmacotherapeutics and pharmacy practice, a recent update of drugs, evidence-based treatment approaches and therapeutic guidelines that could be learned easily through ICT tools which are constantly updated and through virtual simulations. Both being professional programs, requiring adequate competency on the core subjects, a thorough knowledge and skills combined with an appropriate attitude are essential for transitioning from a student to a career-ready professional. To our knowledge, very few studies have assessed the pharmacy students' perceptions and preferences towards online or traditional teaching-learning and assessments. A study done by Colleen McCabe, et al., compared the impact learners' inclination towards this tremendous shift in learning²⁰. A study done by Khan, et al., on Indian students

of the flipped classrooms and traditional classroom-based teaching in pharmacy students. The study observed that, the flipped classrooms did not effectively improved learning in pharmacy students than the traditional didactic course. The study also implicated that, a blended model of teaching may be a better approach which could be achieved by increasing the use of online modules in the delivery of pharmacy curriculum thus reducing the burden on faculty and maximizing finite class time¹⁰. A study by Dalia Almaghaslah et al., on the Pharmacy students' perception towards online learning reported that, the majority of the students opted for classroom-based face-to-face learning than learning in the full online environment. However, the students were in favour of incorporating online learning methods in some courses like communication skills in Pharmacy Practice, Pharmacy regulations and ethics, Hospital pharmacy etc. which demands lesser course work than for courses like Pharmaceutics and Microbiology. The study concluded that, a blend of traditional and ICT tools would be appropriate in the effective delivery of the pharmacy curriculum⁴. A recent study by Ahmed et al., conducted a study on pharmacy students of Saudi Arabia and reported that 66% of the students preferred traditional in-class learning and only 40% opted for viewing lectures through ICT tools like Blackboard for fully online courses. Nevertheless, 50% of the students preferred delivery of pharmacy curriculum courses by both traditional classroom-based lecture style blended with online learning¹¹. The present study also identified that, 59% of the students perceived conventional in-person written examinations were the best mode to measure the attainment of learning outcomes of their program. A study by Lina Elsalem et al., reported that 62.33% of the students perceived that they have not achieved the objectives of their curriculum¹². One of the biggest issues with remote education during the pandemic, according to previous studies, was maintaining and ensuring curriculum delivery integrity, evaluation, educational outcome accomplishment, and curriculum objective fulfillment¹³⁻¹⁵. The present study also identified that around 63% of students stated in-person written examination mode of assessment to be more credible and 60% stated that remote online mode of assessments led to academic dishonesty. Various studies have also reported on academic dishonesty and misconduct as major bottlenecks of remote online exams¹⁶⁻¹⁸. When asked about their preferences, around 71% preferred in-person written examinations and majority stated academic dishonesty, technology inconsistency and technology incompetency as major hurdles or setbacks of online remote assessment mode. Likewise, majority of the pattern of assessment being multiple choice questions was also stated as a major drawback of online assessment mode. A study by Khan et al., had also stated the same as challenges or setbacks on online assessment mode¹⁹. Educational institutions should develop strategies to combat these identified issues, so as to make online method of assessment more effective. The COVID-19 pandemic has caused a tremendous shift in the education sector across the nation from conventional teaching-learning to more ICT-enabled online learning and assessment. Restrictions imposed by the government during the pandemic have forced the educational institutions to drift the teaching and learning to be online. With teachers and students being in the process of adapting to this new teaching and learning style, it is more vital than ever to study the learners' opinions and to explore the reported that, the majority of students preferred e-learning because it allows them to interact with their lecturers, fellow

students, and engage with their study materials while being comfortable and flexible in terms of space and time. One important reason the students chooses e-learning is the ease of access to the study resources. However, this study reports a considerable percentage of students remaining neutral in their preferences for a complete shift to a full online mode of learning. This study had included students from arts and science higher education institutions²¹. The impact of online ICT enabled teaching-learning on delivery of the curriculum for the pharmacy students and the perceptions of the students towards the ICT-enabled teaching in comparison to traditional teaching is first time ever assessed in the present study. With most higher education institutions in India implementing blended learning through various learning management systems, still some institutions are struggling to suddenly adopt to this mode of delivery. As per the University Grants Commission's recommendation in the National Education Policy 2020-2021 for 40% of curriculum delivery in higher education institutions through online mode, the institutions offering Pharmacy programs should outline the curricular content in each course that could be delivered effectively through online teaching. In this scenario, blending online with face-to-face interactions would be a better model of education and it is crucial to prepare the teachers to familiarize the concepts of blended learning and effectively impart them in the teaching learning of career-oriented pharmacy programs.

6. CONCLUSION

The study analysed the perceptions and preferences of the Pharmacy students enrolled in B. Pharm and Pharm. D programs towards traditional classroom-based and online methods of teaching and in-person written versus remote online assessment using a structured questionnaire which was developed and validated for the study. Students' perceptions and their preferences were equal for both traditional and online teaching-learning. Students who

preferred traditional teaching-learning stated that, it enabled them to have a better interaction with their teachers and peers, provide an emotional connection with their teachers. Students who opted for online teaching-learning stated that, it empowered them to have self-directed learning at their own pace and also facilitated ease of access to learning resources. Majority of the students stated that, effective teaching-learning would be achieved through a perfect blend of both traditional face-to-face classes and online teaching-learning. Students' perception was positive for conventional written exams and assessment mode. Their preferences for assessment was also inclined towards in-person written exams since, majority had apprehensions on academic integrity and credibility, technological reliability and competency, pattern of assessment etc. Adequate training for the pharmacy educators towards effective delivery of curriculum and strategies for credible and in-depth assessment of attainment of curricular outcomes is the need of the hour for the higher educational institutions.

7. ACKNOWLEDGMENTS

The authors thank the management of Sri Ramachandra Institute of Higher Education and Research (Deemed to be University) for the Chancellor's summer research fellowship granted for the conduct of this project.

8. AUTHOR CONTRIBUTIONS STATEMENT

Dr. Vanitha Rani N developed the theoretical framework and directed the project. Dr. Shabna Roupal Morais and Dr. Vanitha Rani N were involved in planning and supervised the work and Chandhini R conducted the survey, processed and analysed the data.

9. CONFLICT OF INTEREST

Conflict of interest declared none.

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