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Original Research Article

Impact of COVID-19 lockdown on utilization of massive open online courses among medical students in Tamil Nadu- a cross-sectional study

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ABSTRACT

Background: The massive open online courses are one of the blooming and innovative teaching-learning methodologies in the field of medical science. The current study aimed to assess the utilization of massive open online courses among medical students in Perambalur during the COVID-19 lockdown.
Methods: The cross-sectional study was conducted among medical students using a structured questionnaire from June 2021 to November 2021. The questionnaire focused on knowledge and perception about MOOC, motivators, and barriers to enrolment in MOOC and the level of satisfaction in MOOC courses. Following assessment, univariate and bivariate analysis of data was performed using statistical software and the results were summarized.
Results: The mean age of medical students were 21 years and most of the students were in the first (28.2%) and second year (21.9%). 55.7% of medical students had heard about MOOC and 69.1% of students had enrolled on any one of the online courses. Among those enrolled, 271 students (60.6%) completed the course. The year of study was significantly associated with enrolment to MOOC (p=0.007). The mean age of enrolled students (20.6 years) was lower compared to those not enrolled (20.93 years).
Conclusions: The knowledge and perception among medical students about MOOCs were optimal but utilization and course completion were not satisfactory when the students near their undergraduate course completion. Based on government action, it is evident that MOOC will be one of the major teaching-learning methodologies in the near future and this study will serve as a guiding tool to identify the major motivators and barriers to the utilization of MOOC among medical students.

Keywords: Online education, Online learning, Massive open online courses, Medical students

INTRODUCTION

Online learning platforms and massive open online courses boomed in the last two years. Not many would have expected the much integration of online classes and learning in two years (2020 and 2021). The education sector was one of the worst affected following the COVID-19 pandemic and lockdown all over the world. The long lockdowns forced the schools and institutes to look for a new way of learning. As a result, online learning platforms gained popularity and became a new mode of learning to assess students at school, college and institute levels. With the availability of very less knowledge about such online learning platforms and courses, most institutions and schools struggled to overcome the barriers and the implementation of such online courses in many institutions was mainly by trial-and-error method.

About a decade ago, a new innovative method of teaching and learning was discovered. It was named massive open online courses (MOOC).[1] Very few people were familiar

with MOOCs in the beginning until it emerged as a popular mode of learning in 2012.[2] Since then, many new MOOC platforms came into existence. Each of these platforms offered courses from various fields including health and medicine. The institutions and universities around the world also became interested in the MOOC initiative because it extended their reach, and access and improved the economics by reducing costs and increasing revenues and it improved the educational outcomes paving way for more research on the subjects.[3] At present, the Government of India also introduced its own MOOC platform named 'Swayam' through which the credits are given to students or faculties who have completed a course in it.[4] The new competency-based medical education system for medical undergraduates in India is also persuading the medical institutions to adopt innovative methods of teaching and learning to pave the way for such MOOC courses. But at present, many colleges are facing challenges in the adoption and implementation of new teaching-learning methods.[5] As a result, medical students are also unaware of the availability of such MOOC platforms.[6] This indicates a major pullback in the field of medical research and innovation and creates ignorance among medical students. It is therefore important to assess the utilization of massive open online courses among medical students and identify the motivators and the barriers influencing their utilization.

Objectives

To assess the utilization of massive open online courses among medical students studying in a medical college and hospital in Perambalur. To identify the motivators and the barriers influencing the enrolment of medical students into massive open online courses.

METHODS

The cross-sectional study was conducted among medical college students studying in a medical college and hospital in Perambalur. Perambalur is a small district located in the center of Tamil Nadu with quick access to major cities like Trichy in the south and Salem in the west.

The data collection was interview-based, and the study period was from August 2021 to December 2021. The data was collected from interns and medical students in the academic year 2021-22 studying in a medical institution in Perambalur. All students both male and female above the age of 18 years were included for the study. Irrespective of their clearing medical exams, all students were recruited. They were interviewed during their leisure hours after obtaining the written informed consent. The students who were not willing to participate were excluded from the study.

The present research was done following the ethical principles for medical research involving human participants in accordance with the Declaration of Helsinki 2013. Ethics committee approval was obtained from the institutional ethics committee (IECHS/IRCHS no: 121 July 27,2021-Dhanalakshmi Srinivasan Medical College Hospital).

According to a previous study conducted by Rakesh Kumar et al, the awareness of MOOCs among medical students was 54.9%.[7] Considering this prevalence with a precision of 5% and a 95% confidence interval, the calculated sample size was 380. The 10% attrition or non-participation was also accounted for and the final calculated sample size was 342 and the current study collected data from 447 students in total. Following the determination of the sample size, a simple random sampling method was used to recruit interns and medical students from all four years.

The objective was assessed using a structured questionnaire and a direct face-to-face interview was conducted. The questionnaire contained a total of four sections- general characteristics, knowledge about MOOC courses, motivators and barriers to enrollment in MOOC courses and the level of satisfaction from MOOC courses. The general characteristics included basic details like age, gender, year of study, type of device and internet usage, and hours of internet and device usage. The knowledge about MOOC was assessed based on students' knowledge and awareness of the MOOC platforms, their interest to participate in such courses, level of enrollment and completion of such courses. The motivation and barriers for enrollment and the satisfaction from such enrolled courses were based on multiple themes that arrived in previous studies. The data collection was maintained anonymous without collecting any personal details like the respondents' names or mail id and the participant's informed consent was obtained before the study.

The data collected was entered in Microsoft Excel and analyzed using SPSS version 21 software. The descriptive analysis was done based on the type of data. The categorical data were represented in the form of frequencies and percentages. For the continuous type of data, based on the tests of normality, the data were represented either as mean and standard deviation or median and quartile deviation. Tests of significance were performed using appropriate tests like Chi-square tests for the bivariate analysis and odds were also calculated.

RESULTS

Socio-demographic profile and use of information technology by medical students

Among the study participants, 272 (60.9%) were female and 175 (39.1%) were male. The median age of the study participants was 21 years with an interquartile range of 2. Most of the study respondents were from I MBBS (28.2%) followed by II MBBS (21.9%), III MBBS (part

I) (20.8%), interns (16.1%) and III MBBS (part II) (13.0%). Almost all the students were using smartphones (98.9%). Average hours of devise and internet use per week by students were 30 hours and the average monthly expenditure on the internet was 240 rupees. Most of the students used digital devices for studying (98%), followed by entertainment (91.5%), browsing internet (87.7%) and social networking (83.9%) and gaming (36.2%). A significantly higher proportion of males used a digital device for gaming (p=0.001, OR=0.275) as compared to females who used digital devices mainly for studying (p=0.016, OR=5.625). Internet was used mainly for studying (98%), entertainment (91.9%) and social networking purposes (83.9%). Internet usage was significantly higher among females for study purposes (p=0.016, OR=5.625) and games (p=0.001, OR=0.266) among males (Table 1).

Table 1: Socio-demographic profile and usage pattern of information technology among study participant.

	Sex N (%)		Total	P value	Odds ratio
	Male (n=175)	Female (n=272)			
Age (years) (median±quartile deviation)	21±2	21±2	21±2	0.776	-
Year of study					-
I MBBS	47 (26.9)	79 (29.0)	126 (28.2)	0.536	
II MBBS	39 (22.3)	59 (21.7)	98 (21.9)		
III MBBS (part 1)	40 (22.9)	53 (19.5)	93 (20.8)		
III MBBS (part 2)	26 (14.9)	32 (11.8)	58 (13.0)		
Internship	23 (13.1)	49 (18.0)	72 (16.1)		
Type of digital devise used					
Smartphone	175 (100.0)	267 (98.2)	442 (98.9)	0.071	0.604
Laptop	80 (45.7)	128 (47.1)	208 (46.5)	0.781	1.056
Tablet	43 (24.6)	48 (17.6)	91 (20.4)	0.076	0.658
Desktop computer/smart TV	24 (13.7)	26 (9.6)	50 (11.2)	0.174	0.665
Hours of device use per week (median±quartile deviation)	32±28	30±28	30±28	0.65	-
Purpose of device use					
Entertainment	162 (92.6)	247 (90.8)	409 (91.5)	0.514	0.793
Browse internet	150 (85.7)	242 (89.0)	392 (87.7)	0.306	1.344
Study	168 (96.0)	270 (99.3)	438 (98.0)	0.016	5.625
Social networking	151 (86.3)	224 (82.4)	375 (83.9)	0.270	0.742
Gaming	95 (54.3)	67 (24.6)	162 (36.2)	0.001	0.275
Internet use					
Yes	172 (98.3)	270 (99.3)	442 (98.9)	0.337	2.355
No	3 (1.7)	2 (0.7)	5 (1.1)		
Type of internet connectivity					
Mobile internet	168(96.0)	269 (98.9)	437 (97.8)	0.043	3.736
Landline broadband	43(24.6)	70 (25.7)	113 (25.3)	0.782	1.064
Hours of internet use per week (median±quartile deviation)	30±25	30±27	30±28	0.824	-
Purpose of internet use					
Entertainment	163 (93.1)	248 (91.2)	411 (91.9)	0.456	0.761
Browsing websites	153 (87.4)	237 (87.1)	390 (87.2)	0.927	0.974
Social networking site	150 (85.7)	225 (82.7)	375 (83.9)	0.401	0.798
Study	168 (96.0)	270 (99.3)	438 (98.0)	0.016	5.625
Gaming	93 (53.1)	63 (23.2)	156 (34.9)	0.001	0.266
Monthly expenditure on internet in Indian rupees (median±quartile deviation)	250±200	230±200	240±200	0.363	-

Awareness and utilization of MOOC

Overall, 249 (55.7%) of medical students had ever heard about MOOC. Awareness among females (59.2%) was higher than among male students (50.3%). When asked "whether you are interested to participate in any online course", 169 students (37.8%) responded negatively. A total of 309 (69.1%) students had enrolled for any online course. Of those who enrolled on the online course, 271 students (60.6%) completed the course. Among those who completed, 261 students (58.4%) got certificates (Table 2).

Table 2: Knowledge, attitude, enrolment, completion and certification to MOOCs.

	Sex		Total	P value	Odds ratio
	Male N (%)	Female N (%)			
Heard of any MOOC					
Yes	88 (50.3)	161 (59.2)	249 (55.7)	0.064	1.434
No	87 (49.7)	111 (40.8)	198 (44.3)		
Interested to participate in MOOC					
Yes	104 (59.4)	174 (64.0)	278 (62.2)	0.334	1.212
No	71 (40.6)	98 (36.0)	169 (37.8)		
Enrolled to MOOC					
Yes	109 (62.3)	200 (73.5)	309 (69.1)	0.012	1.682
No	66 (37.7)	72 (26.5)	138 (30.9)		
Completed enrolled course*					
Yes	96 (88.1)	175 (87.5)	271 (87.7)	0.042	-
No	13 (11.9)	25 (12.5)	38 (12.3)		
Obtained certificate for completed course#					
Yes	89 (92.7)	172 (98.3)	261 (96.3)	0.009	-
No	7 (7.3)	3 (1.7)	10 (3.7)		

Table 3: Determinants of enrolment to MOOC among medical students.

	Enrolment		Total	P value	Odds ratio
	Yes, N (%)	No, N (%)			
Age (years) (median±quartile deviation)	21±3	21±2	21±2	0.763	-
Year of study					
I MBBS	91 (29.4)	35 (25.4)	126 (28.2)	0.007	-
II MBBS	60 (19.4)	38 (27.5)	98 (21.9)		
III MBBS (part 1)	70 (22.7)	23 (16.7)	93 (20.8)		
III MBBS (part 2)	47 (15.2)	11 (8.0)	58 (13.0)		
Internship	41 (13.3)	31 (22.5)	72 (16.1)		
Type of digital devise used					
Smartphone	304 (98.4)	138 (100.0)	442 (98.9)	0.133	0.688
Laptop	159 (51.5)	49 (35.5)	208 (46.5)	0.002	1.925
Tablet/iPad	64 (20.7)	27 (19.6)	91 (20.4)	0.781	1.074
Desktop computer/smart TV	33 (10.7)	17 (12.3)	50 (11.2)	0.611	0.851
Hours of device use per week (median±quartile deviation)	30±28	30±28	30±28	0.347	-
Purpose of device use					
Entertainment	284 (91.9)	125 (90.6)	409 (91.5)	0.641	1.181
Browse internet	276 (89.3)	116 (84.1)	392 (87.7)	0.118	1.586
Study	305 (98.7)	133 (96.4)	438 (98.0)	0.105	2.867
Phone calls	276 (89.3)	116 (84.1)	392 (87.7)		
Social networking	266 (86.1)	109 (79.0)	375 (83.9)	0.059	3.411
Gaming	113 (36.6)	49 (35.5)	162 (36.2)	0.829	1.047
Internet use					
Yes	307 (99.4)	135 (97.8)	442 (98.9)	0.156	
No	2 (0.6)	3 (2.2)	5 (1.1)		
Type of internet connectivity					
Mobile internet	305 (98.7)	132 (95.7)	437 (97.8)	0.044	3.466
Landline broadband	83 (26.9)	30 (21.7)	113 (25.3)	0.250	1.322
Hours of internet use per week (median±quartile deviation)	30±26	30±28	30±28	0.095	-
Purpose of internet use					
Entertainment	286 (92.6)	125 (90.6)	411 (91.9)	0.478	1.293
Browsing websites	277 (89.6)	113 (81.9)	390 (87.2)	0.023	1.915
Social networking site (Facebook, Instagram, WhatsApp, twitter, etc)	263 (85.1)	112 (81.2)	375 (83.9)	0.293	1.327
Study	306 (99.0)	132 (95.7)	438 (98.0)	0.019	4.636
Gaming	108 (35.0)	48 (34.8)	156 (34.9)	0.972	1.007
Monthly expenditure on internet (median±quartile deviation)	225±299	245±199	240±200	0.679	-

Determinants of enrolment to MOOC among medical students

The year of study was significantly associated with enrolment to MOOC (p=0.007). The mean age of enrolled students (20.6 years) was lower compared to those not enrolled (20.93 years). Similarly, the enrolment rate was significantly higher among I MBBS and III MBBS students. 29.4% of enrolled students were I MBBS compared to 25.4% of non-enrolled students who were I MBBS. Similarly, 22.5% of non-enrolled students were interns as against 13.3% enrolled who were interns. Among the enrolled students, laptop usage was significantly higher among males as compared to females. (p=0.002, OR=1.925) The usage of the internet for browsing websites was also significantly higher among males as compared to females (p=0.023, OR=1.915) but the female students used the internet more for study purposes (p= 0.019, OR=4.636) (Table 3).

Motivation and barriers to enrolment in MOOC

An important motivation for enrolment was learning new things (90%), learning medicine (86.7%) and better career prospects (79%). The most common barriers to enrolment agreed or strongly agreed was low internet (30.4%) and lack of time (62.3%).

Very few disagreed on lack of access to technology (15.2%), difficulty in the language of the course (10.2%) and lack of computer skills (14.5%) as the barriers to enrolment in the online course (Table 4).

Table 4: Motivation and barriers for enrolment to MOOC, N (%).

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Motivations for enrolment (n=129)					
Learning new things	134 (43.4)	144 (46.6)	27 (8.7)	2 (0.6)	2 (0.6)
It helps in learning medicine	128 (41.4)	140 (45.3)	34 (11.0)	3 (1.0)	4 (1.3)
For obtaining a certificate	132 (42.7)	124 (40.1)	37 (12)	10 (3.2)	6 (1.9)
For better career prospects	100 (32.4)	144 (46.6)	56 (18.1)	5 (1.6)	4 (1.3)
For communicating with peers	62 (20.1)	104 (33.7)	108 (35.0)	25 (8.1)	10 (3.2)
Barriers for enrolment (n=279)					
Lack of time	28 (20.3)	58 (42)	31 (22.5)	12 (8.7)	9 (6.5)
Low internet speed	13 (9.4)	29 (21.0)	40 (29.0)	30 (21.7)	26 (18.8)
Lack of computer knowledge/skills	4 (2.9)	16 (11.6)	28 (20.3)	53 (38.4)	37 (26.8)
Difficulty in language of course	3 (2.2)	11 (8)	26 (18.8)	59 (42.8)	39 (28.3)
Lack of access to technology	3 (2.2)	18 (13)	31 (22.5)	49 (35.5)	37 (26.8)

Table 5: Level of satisfaction with completed and certified course, N (%).

Parameters	Very satisfactory	Satisfactory	Neutral	Disappointed	Very disappointed
Overall experience	64 (24.5)	159 (60.9)	34 (13)	3 (1.1)	1 (0.4)
Quality of presented material	68 (26.1)	153 (58.6)	36 (13.8)	3 (1.1)	1 (0.4)
Technology used	65 (24.9)	145 (55.6)	45 (17.2)	4 (1.5)	2 (0.8)
Video lectures	70 (26.8)	147 (56.3)	38 (14.6)	4 (1.5)	2 (0.8)
Exams and assignment	47 (18)	142 (54.4)	66 (25.3)	5 (1.9)	1 (0.4)
Student-instructor interaction	40 (15.3)	111 (42.5)	89 (34.1)	15 (5.7)	6 (2.3)
Student-student interaction	40 (15.3)	99 (37.9)	95 (36.4)	20 (7.7)	7 (2.7)

Level of satisfaction with completed and certified course

Among those who completed the course, most of them had a satisfactory or very satisfactory level of satisfaction with regard to the overall experience (49.9%), quality of presented material (84.7%), the technology used (80.5%), and video lectures (83.1%). However, a lower proportion of students reported satisfaction for parameters such as exams and assignments (72.4%), student-instructor interaction (57.8%) and student-student interaction (53.2%) (Table 5).

DISCUSSION

The present study was done to assess the utilization of massive open online courses among medical students. The study found that only 55.7% have heard about the term massive open online courses but 69.1% of the students have already enrolled in any one of the massive open online courses. It shows that even though the students are not aware of the term, many are still utilizing it. This is in contrast to a study conducted by Wang in Taiwan, where only 35% were familiar with MOOCs.[6]

The prime reason for this may be due to the difference in uptake of MOOC courses in different countries.

Among the enrolled students, our study observed the involvement of girl students was more and the active participation and completion of the course were also high among female participants. As per the all India survey on higher education (AISHE) 2019-20, the gross enrolment ratio of female students stands at 27.3%, more than that of male students, which is 26.9%.[8] This indicates the increased enrolment ratio for the education of female children as compared to males in the present decade. Though male participation and completion are less, the overall status of course completion among students is satisfactory (87.7%). This is in contrast to a study conducted by Nilanjana et al in Assam, where only 26.2% of students completed the course.[9] The probable reason could be due to more awareness generated by faculties and institutions among students in that specific region.

In our study, 62.2% of students were interested to participate in MOOCs and the participation rate was high among first and second-year students compared with the final-year students and interns. Most of the first and second years had access to Smartphones and the internet from their school days while interns and final years had not. This may be the probable reason for more participation among the younger generations as they are more comfortable with the usage of smartphones.

One interesting finding is most of the male students used smartphones and the internet mainly for gaming activities while female students used them mainly for studying. This is probably because of higher motivational states in males, as well as gender differences in reward prediction, learning reward values and cognitive state during gaming.[10]

MOOCs are a popular way for professionals to meet their current and future educational demands. But many motivators and barriers influence the utilization of MOOCs. The common motivators for MOOC courses identified in our study are the urge to learn new things (90%) followed by an easy tool to learn medicine efficiently (86.7%) and to obtain a certificate (82.8%). The most common barriers to enrolment in MOOC courses among the medical students in our study are lack of time (62.3%) and lack of internet or poor internet connectivity (30.4%). This is in contrast to the study conducted by Batticulon in the Philippines where the most common barriers were difficulty adjusting to new learning styles or poor communication with educators.[11] The reason for this difference is that most of the barriers addressed in our present study are based on the barriers identified in the previous studies which may be different from the barriers addressed by Batticulon's study.[11] As for as satisfaction is concerned, very few are dissatisfied with MOOC courses while most of the participants are satisfied overall.

Since there is no standard questionnaire available to assess the utilization of MOOC, the internal validity of the data may get affected. Very few studies are available about the knowledge and perception among medical students regarding the massive open online courses. In the present study, the data was collected from a single institute which may limit the generalization of a study finding to other settings. So, studies among medical students studying in different regions and demography will help strengthen the findings of our present study.

Secondly, the online survey tool has its limitation. In terms of the number of responses, only 447 students responded in the present study among 750 students with a low response rate. The level of engagement with the survey is low and it is difficult reaching certain participants. To overcome such limitations, direct face-to-face interviews will enhance more participation rate and result in a better response rate.

CONCLUSION

Based on government action, it is evident that MOOCs will be a part of the blended learning model in the near future and this study will serve as a guiding tool for the effective implementation of such courses.

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