Research article

Perception of medical students about online learning in the COVID-19 era

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ABSTRACT

Introduction and Aim: The COVID-19 pandemic has caused a disruption in the academic schedule. As UNESCO observes an 87% interruption in student learning across the globe, it is undeniable that e-learning would have a major role to play in the future and both teachers and learners are getting accustomed to this ‘New Normalcy’. This survey analyses the perception of medical first-year students about online learning in the COVID-19 era.

Materials and Methods: A cross-sectional descriptive questionnaire based study was done and first year medical students were asked to respond. The respondents were asked to answer the questions in Likert-scale, from 1-5. Statistical analysis was done and Test for one proportion was calculated using ‘z’ test. A p-value of <0.05 was considered significant.

Results: A total of 122 first year medical students responded to the survey. More than two-thirds of the respondents were females (67%). About 78% of respondents find online learning interesting and enjoyable. More than 80% of students found online education very satisfactory in all aspects. Problems with internet connectivity was the principal challenge faced by the students during online learning. An overwhelming 70% of students felt online teaching to be very beneficial.

Conclusion: The pandemic has posed an unprecedented challenge to the academic schedule. Although many challenges were faced by the teachers and learners, internet connectivity continued to be a major problem in online education. It is the duty of every educationist to ensure an uninterrupted, continuous and an effective process of teaching and learning.

Keywords: e-learning, internet, COVID-19, online, education.

INTRODUCTION

Online education has now become a well-accepted modality of education in many universities. Multiple studies highlight the growing need for execution of e-learning (1-3). Many universities across the world promote e-learning as the future mode of teaching method and is being widely popular amongst the students and learners (4). The reasons why such e-learning tools are accepted widely by learners is that they are easy to use, have shown flexibility in the timing of education and better control over the environment. However, a few studies suggest that a lack of teacher-student interaction has been described as a major limitation (5, 6). Though universities across the globe have adapted themselves to innovative methods of distant education over the last two decades, medical educators have been rather resistant to such changes happening, all these years.

The concept of Anatomy Education for the medical students has been witnessing a constant but a steady change in the last two decades. While we come across abundant literature on the changing medical curriculum, we could also notice a gradual shift happening from the conventional/traditional teaching methods towards small group teaching, vertical integration modules and clinical anatomy teaching. Sarah et al, while reassessing the value of traditional university lectures, suggested more innovative and alternative approaches to lectures are needed, to adapt to the changing educational environment (7).

The ‘New Normal’ situation that the novel Coronavirus (COVID-19) pandemic has caused has resulted in a paradigm shift in the Medical education concepts across the globe. The global academic schedule has gone into disarray due to the COVID-19 pandemic in the last few months. UNESCO Director-General Audrey Azoulay observed that one has never before witnessed educational disruption on such a large scale due to an invisible virus. At this crucial time, where 87% of the world’s learningcommunity is interrupted by COVID-19 induced school closures, UNESCO initiates a global education movement to aid and support countries to scale up their distance teaching/learning practices and reaching out to the target group of children and youth who need education, the most (8).

While it is undeniable that the pattern of work, the method of socialising, the options of relaxation and
the process of communication across the globe have been pushed to a quarantine mode, the concepts of education and learning are no exception to that (9). It is a well-accepted fact now that this new pandemic has added a new dimension to the pattern of medical teaching.

While e-learning is a familiar portal of education in many top universities, this pandemic has pushed all medical schools across the globe to be shut down temporarily but indefinitely, forcing all medical educators and students to adapt themselves to the various options of online education. This survey analyzes the perception of medical first-year students about online learning in the COVID-19 era and also discusses the problems faced by the students in adapting to the new environment.

MATERIALS AND METHODS

A cross-sectional descriptive questionnaire-based study was done by the Department of Anatomy of a Tertiary care Medical College in South India to which the first author was previously associated with. The first year medical students participated in the survey. As e-learning was not routinely practised earlier various web conferencing platforms and web-services were tried out. Students’ preference and the teachers’ comfort on the most convenient, effective and most user-friendly platform/web-service were identified. The participants were selected by convenience sampling. The questionnaire was circulated amongst the medical students through google forms and the students were asked to answer them with a single most appropriate response. All responses were collated and analyzed. Those participants with an incompletely filled questionnaire were excluded from the study.

The questionnaire was subdivided into six sections. Section 1 contained basic information about the participants, their year of study and their basic understanding of the usage of computers or smartphones. Section 2 included questions related to the students' perception of online education. Their comfort level of online classes was graded on a 5-point Likert scale with 5 being 'very satisfactory' and 1 being very dissatisfactory. It also included questions related to the students’ preference towards the type of communication preferred, web-conferencing platforms that they find user-friendly and the type of online classes preferred. Section 3 was related to the challenges associated with online teaching. Seven limitations were shortlisted, including the language barrier, inability to meet with friends, lack of two-way communication, internet connectivity issues, difficulties in concentration, academic dishonesty and lack of co-curricular activities. Students were asked to answer each of the 7 sub-questions by a 5 point Likert scale, with 5 representing more challenges and 1 indicating fewer challenges faced. For data analysis, responses for these 7 questions were put in two groups. Those who responded as Likert 1 and 2 were grouped as fewer challenges faced (favouring online education), while those who responded as 4 or 5 were grouped as more challenges faced (unfavourable for online education). The intermediate group who responded with Scale 3 were considered equivocal.

Section 4 contained questions related to the students’ overall satisfaction about the clinical usefulness of online education, with the answers through a 5 point Likert scale. For analysis, respondents with Likert scale 1 and 2 were put in the unsatisfied group, while those from 4 and 5 were grouped as Satisfied group. Those who responded with a scale 3 were considered equivocal.

Section 5 rated the benefits and limitations of the online classes from students’ point of view. Respondents with a Likert scale 4 and 5 were classified as Benefitted group while 1 and 2 were grouped as ‘Not benefitted’. Those who responded with a scale 3 were considered equivocal. Section 6 raised questions related to the prospects of online education. A total of 17 sub-questions from various sections of the questionnaire were tabulated in Tables 2, 3 and 4. Statistical analysis was done on the results obtained.

Statistical analysis

SPSS version 23 was used for data analysis. All parameters from the Likert scale scoring were tabulated and analysed. Test for one proportion was calculated using ‘z’ test, for the sample size of 122, keeping the null hypothesis value at 50%. The observed proportion expressed as a percentage was calculated for all the 17 parameters in the questionnaire and the significance level was calculated. A p-value of <0.05 was considered to be statistically significant.

Three tabulations (Tables 2, 3 and 4) contain students' responses in the Likert scale. Those with responses 1 and 2 were clubbed together as one group while those with scale 4 and 5 responses were considered together as the other group. Those respondents, who had given a scale 3 were considered equivocal and could not be included in either of the two groups and hence were not considered for statistical analysis. These two groups were compared for each of the sub-questions and the p-value was calculated using Test for one proportion. This methodology was adopted for Tables 2, 3 and 4 that contain students’ responses as Likert scale.

In the tabulation that analyzed the list of challenges faced by the respondents (Table 3), an additional analysis was done to identify the most significant challenge faced by students in online teaching. A weighted average score was also calculated combining all 5 Likert scale scores and a Mean score.
was then calculated to identify and rank the most significant challenge faced by the students.

The weighted average score was calculated as follows: The product of the Likert scale score and the number of respondents for each of the sub-question was calculated for each of the scores. The sum of such scores for each of the Likert scales was tabulated as the weighted average score for that sub-question. The Mean score was then calculated by dividing the weighted average score by the total number of respondents (n=122). The highest mean score will be considered as the most significant challenge faced by the respondents.

**RESULTS**

A total of 122 medical students were asked to participate in the questionnaire survey. All of them were first-year students, who underwent their regular academic sessions through online teaching. Fig 1 illustrates the demographic data of our participants.

![Fig. 1: Demographic data of the 122 respondents. 1a shows the sex distribution and 1b shows the duration of smart phone usage by the respondents.](image)

About two-thirds of respondents (n=82, 67.3%) were females (Fig 1a). Most of the students are comfortable with smartphone usage. More than 61% of them have been using smartphones for more than 1 year (Fig 1b). Table 1 describes the students’ perceptions of the fundamentals of online education.

**Table 1: Students’ perception about the fundamentals of online education**

| Feature                                      | Number | Percentage (%) |
|----------------------------------------------|--------|----------------|
| **Student perception of online education**   |        |                |
| Enjoyed                                      | 51     | 41.8           |
| Monotonous, but enjoyable                    | 44     | 36.1           |
| Boring                                       | 13     | 10.7           |
| Did not like                                 | 14     | 11.5           |
| **What type of communication do you prefer for online education?** |        |                |
| Power point                                  | 5      | 4.1            |
| Power point with audio                       | 84     | 68.9           |
| Power point with video                       | 22     | 18             |
| Face to Face lectures                        | 11     | 9              |
| **Preferred web conferencing platforms**     |        |                |
| Zoom                                         | 12     | 9.8            |
| Webex                                        | 5      | 4.1            |
| Google classroom                             | 13     | 10.7           |
| Go To Meeting                                | 92     | 75.4           |
| **Do you prefer online classes in future?**  |        |                |
| Yes                                          | 78     | 63.9           |
| No                                           | 44     | 36.1           |
| **Type of online communication preferred**   |        |                |
| One way                                      | 32     | 26.2           |
| Interactive                                  | 90     | 73.8           |
| **Was online education understandable?**     |        |                |
| Yes                                          | 87     | 71.3           |
| No                                           | 35     | 28.7           |
| **Advantages of online education**           |        |                |
| Flexible study hours                         | 10     | 8.2            |
About 78% of students found such teaching to be either enjoyable and interesting or monotonous but enjoyable while 22% of them find it boring. Nearly 87% of the participants feel that a regular PowerPoint method of teaching with audio or video would be preferred. Nearly two-thirds (64%) of them prefer online teaching in future. Table 2 illustrates the overall satisfaction coefficient of online education.

Table 2: Overall Students’ perception and satisfaction of online education (Likert scale 1 to 5)

| Students’ perception and satisfaction of online education (n=122) |
|---------------------------------------------------------------|
| **Likert Scale** | Unsatisfied group | Satisfied group | p-value | 95% CI (%) |
| How effectively did the online teaching help you learn? | 4 (5.2%) | 12 (15.6%) | 45 | 48 (62.3%) | 13 (16.9%) | 0.0001 | 12.39% to 31.56 % |
| How easy was the access to online teaching? | 2 (2.5%) | 9 (11.3%) | 42 | 47 (58.8%) | 22 (27.5%) | <0.0001 | 7.07% to 23.27 % |
| How engaging you found online teaching? | 2 (3%) | 13 (19.4%) | 55 | 39 (58.2%) | 13 (19.4%) | <0.0001 | 5.48% to 22.49 % |
| How visually attractive you found online teaching? | 5 (7.1%) | 10 (14.3%) | 52 | 39 (55.7%) | 16 (22.9%) | <0.0001 | 12.50% to 32.84 % |
| Level of effectiveness of communication in online teaching | 1 (1.2%) | 16 (19.5%) | 40 | 47 (57.3%) | 18 (22%) | <0.0001 | 12.54% to 31.07 % |

More than 80% of students found online education very satisfactory in all aspects and there was a statistically significant difference between the satisfied and unsatisfied group. Table 3 discusses the challenges faced by students during online teaching.

Table 3: Challenges associated with online teaching (5 – Strongly agree. 1 – Strongly disagree).

| Challenges faced during online teaching (n=122) |
|------------------------------------------------|
| **Likert Scale** | Less challenges | Equivocal | More Challenges | Weighted average Score (for 1-5) | Mean Score (for 1-5) | p-value |
| Language Barrier | 42 (51.1%) | 17 (20.7%) | 40 | 17 (20.7%) | 6 (7.3%) | 294 | 2.41 | =0.0001 |
| Inability to meet Friends | 14 (15.4%) | 10 (11%) | 31 | 26 (28.5%) | 41 (45.1%) | 436 | 3.57 | <0.0001 |
| Lack of two-way communication | 12 (15.4%) | 15 (19.2%) | 44 | 36 (46.1%) | 15 (19.2%) | 393 | 3.22 | =0.0065 |
| Lack of co-curricular activities | 12 (13.2%) | 7 (7.7%) | 31 | 29 (31.8%) | 43 (47.3%) | 450 | 3.69 | <0.0001 |
| Problems with Internet connectivity | 7 (6.3%) | 9 (8.1%) | 11 | 44 (39.6%) | 51 (46%) | 489 | 4.01 | <0.0001 |
| Difficulty to concentrate | 11 (12.2%) | 11 (12.2%) | 32 | 35 (38.9%) | 33 (36.7%) | 434 | 3.56 | <0.0001 |
| Academic dishonesty | 15 (19.7%) | 18 (23.7%) | 46 | 29 (38.2%) | 14 (18.4%) | 375 | 3.07 | <0.0001 |
Participants with a response of Likert scale 1 and 2 were grouped as those facing fewer challenges and those respondents with scales 4 and 5 as those facing more challenges. There was a statistically significant difference observed in all the challenges faced by the respondents. The most significant challenge faced by the students was the problems associated with internet connectivity, as evident from the weighted average and mean scores, which was maximum for this challenge. Lack of co-curricular activities, inability to meet and interact with friends and difficulty to concentrate and keep focussed on online sessions were the next challenges faced. Table 4 describes the benefits and disadvantages of online teaching.

**Table 4: Benefits of online classes (5 – well benefited, 1 – not benefited)**

| Benefits of online classes (n=122) | Not benefitted group | Equivocal | Benefitted group | p-value z test | 95% CI (%) |
|-----------------------------------|----------------------|-----------|------------------|---------------|------------|
| *How convenient was your learning through online portal?* | 1                    | 2         | 3                | 4             | 5         |
|                                    | 2                    | 2.7%      | 16               | 48            | 42        |
|                                    |                      |           |                  |               | 56.8%     |
|                                    |                      |           |                  |               | 14        |
|                                    |                      |           |                  |               | 18.9%     |
|                                   <0.0001               | 15.08% to 35.66%     |
| *How do you rate the cost effectiveness of online education?* | 3                    | 4.1%      | 10               | 48            | 41        |
|                                    |                      |           |                  |               | 55.4%     |
|                                    |                      |           |                  |               | 20        |
|                                    |                      |           |                  |               | 27%       |
|                                   <0.0001               | 9.72% to 28.20%      |
| *Were you able to adopt flexibility in the timing of classes?* | 5                    | 5.9%      | 23               | 37            | 39        |
|                                    |                      |           |                  |               | 45.8%     |
|                                    |                      |           |                  |               | 18        |
|                                    |                      |           |                  |               | 21.2%     |
|                                   <0.0001               | 14.48% to 33.29%     |
| *Were you able to learn at your own pace?* | 8                    | 9%        | 18               | 33            | 34        |
|                                    |                      |           |                  |               | 38.2%     |
|                                    |                      |           |                  |               | 29        |
|                                    |                      |           |                  |               | 32.6%     |
|                                   <0.0001               | 20.04% to 39.79%     |
| *Do you think online education would make it easy for slow learners and shy students to interact better?* | 15                   | 17.7%     | 26               | 37            | 26        |
|                                    |                      |           |                  |               | 30.6%     |
|                                    |                      |           |                  |               | 18        |
|                                    |                      |           |                  |               | 21.1%     |
|                                   = 0.7539               | 37.32% to 59.40%     |

An overwhelming 70% of students felt that such online teaching programs are indeed greatly beneficial. The difference between the benefited and non-benefited groups was statistically significant. Fig. 2 describes the preferred mode of teaching in future.

**Fig. 2: Students’ perception about the preferred mode of teaching in future**

About 55% of students prefer to have a blend of online and classroom teaching while 22% of them felt the need for more classroom teachings in future.

**DISCUSSION**

Ever since the World Health Organization (WHO) coined this dreaded disease caused by severe acute respiratory syndrome coronavirus 2 as Covid-19 in February 2020 and further labelling it as a Pandemic in March 2020, the immediate future of conventional medical teaching and routine cadaveric teaching also came under intense scrutiny (10). The added unclear risk associated with getting infected by contact with
the patients who died due to COVID-19 virus may be debated when body donation schemes restart (11).

With social distancing and limitation of public movements being enforced and followed during the lockdown period, more emphasis is given for e-learning and online education. This questionnaire survey gives us an understanding of the medical students’ perception of online education. Nearly 78% of the respondents have either enjoyed or find online education enjoyable. Only the remaining 22% either disliked it or found it too boring. This makes us understand that medical students adapt themselves so fast to the innovations in medical teaching. As even the regular classroom teaching takes place by using PowerPoint presentations, an overwhelming 91% of respondents find it comfortable to have the sessions run on power-point with audio and video presentation.

More than 75% of students opted for Go to Meeting over WebEx and Zoom as their preferred web conferencing platform. The unlimited cloud recording, better look and feel of online meetings without extra charges probably made Go to Meeting a preferred web platform for online education.

Sloan and Lewis observed that the recent advances in the field of innovative technology have made a significant improvement in the students’ learning experiences in the last few years (12). The students become self-directed learners and find online education as a useful tool in distant learning. Lucieer et al., and Kim et al., observed that this form of self-regulated learning would offer a tremendous boost in academic performances in medical education (13,14). In his study on 949 medical students, Lucieer observed a growing need for enhancement of self-regulated learning skills and encouraged the medical schools to re-evaluate their curriculum methods to improve the student learning skills. Kim et al., in their preliminary study, had reiterated the need for facilitating an increased usage of the students’ cognitive and metacognitive strategies. An overwhelming 92% of respondents in our study have preferred a Learner-content and Learner-instructor interaction, further stressing upon the fact that students indeed prefer self-regulated learning.

While most of the published literatures talk about the advantages of e-learning, the challenges faced during online education also needed to be looked into. In our study, we observed that language was not a barrier for effective communication, which means that English, being the medium of education, is comfortable for all. When each of the challenges listed was critically analyzed, internet connectivity continued to pose a real challenge to many respondents. As the online teaching goes on live streaming, numerous students face either a lag in the video or the audio connectivity, thereby disrupting the natural flow of understanding of the subject. This is closely followed by lack of co-curricular activity and inability to meet and chat with friends, which goes to also show that students, though comfortable with online portal of education, still are longing for that opportune moment to meet up with and greet their friends and mates. A similar study by Longhurst et al identified lack of practice sessions, reduced student engagement and difficulty in maintaining a student-teacher relationship during online teaching as the major challenges faced (15).

A deeper insight into the relationship between the teachers and student-derived satisfaction from technological advancements (in medical education) and the value and significance that they place on such requirements should be quite explicit to successfully implement that technological advancement (16). Or in other words, the merit of the accomplished requirement may also sometimes influence the level of end-user (student) satisfaction. Our study has shown that the students’ satisfaction levels with online education were comparable to that of multiple previous studies (17, 18).

Customers perceive that product attributes and employee competence are the most critical factors of quality management in the software industry (19). When the same logic was extrapolated to online medical education, Rajab et al observed that good teaching is always good teaching irrespective of whether it happens face-to-face or in virtual surroundings (20). In our survey, we observed that a majority were satisfied with the online teaching, the effectiveness of communication, easily accessible and also found it engaging and visually attractive. The difference between the satisfied and the unsatisfied group was statistically significant. A significant number of students find online teaching beneficial.

CONCLUSION

The COVID-19 pandemic has caused a paradigm shift in the teachers’ and learners’ mindset. Though there were a few shortcomings with the ‘new normal’ COVID-19 era, students and teachers have adapted themselves better to the newer methods of teaching and learning. The challenges and difficulties posed by the pandemic in medical teaching expected to be related to the usage of newer technology, internet accessibility, student assessment, communication between the teacher and learner but students were equally anxious to mingle with their friends and mates and preferred co-curricular activities equally. As we all would agree, Change is permanent, but usually happens gradual and insidious. However, the current pandemic crisis has forced the academicians and educational reformers to make rapid preparations and radical adjustments in such a short period, that too, without prior notice. At this crucial juncture, when the whole world is fighting to combat the deadly virus, the onus is on the educationist and the
academicians to keep the process of teaching and learning continuous, effective and uninterrupted.

CONFLICTS OF INTEREST
Authors declare no conflicts of interest.

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