ORIGINAL ARTICLE

# COMPARISON BETWEEN ONLINE AND ON CAMPUS CBL SESSIONS: PERCEPTIONS OF STUDENTS IN HITEC-IMS, TAXILA

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**Background:** Medical colleges and educational institutions around the world underwent a major shift of teaching methodology from regular classroom environments to virtual classrooms during the COVID-19 pandemic. While many instructional methodologies were easily conducted in both formats, interactive activities requiring group participation like CBLs presented a big challenge. The objective of this study was to compare Online and On-campus formats of CBL sessions through students' feedback and identify the areas in both formats that require amelioration. **Methods:** A cross-sectional, descriptive study was conducted at HITEC-IMS, Taxila including 185 students from 1st year and 2nd year MBBS who had attended at least 4 CBL sessions online and on campus formats. The questionnaire comprised of statements evaluating 5 major constructs: Acquisition of knowledge (AK), Critical thinking (CT), Communication skills (CSKILL), Presentation skills (PS), and Physical Environment (PE). Responses were assessed on a 5-points Likert scale. Data was analysed on SPSS-28. The two formats were compared using Chi-square test, and $p \leq 0.05$ was considered significant. **Results:** Responses for acquisition of knowledge (74.6% *vs* 69.2%) and critical thinking (75% *vs* 70%) were comparable for both formats while online format was lacking in attainment of communication skills (67% *vs* 80%) and presentation skills (56.8% *vs* 71.4%). **Conclusion:** Respondents perceived On-campus format as a better option for conduction of CBL.

**Keywords:** CBL, Online format, On-campus format
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## INTRODUCTION

The concept of virtual learning is known since 1990 and is evolving rapidly with advancement in digital technologies. Online teaching and learning has been promoted by many countries[1] for years but its implementation in educational institutes especially in the developing countries remained a challenge. The issues of administration, infrastructure requirement, access, availability of internet facility and lack of trained staff have been a major setback.[1,2] Keeping the students motivated and inclined to use e-learning materials have been a problem at individual student level.[3,4]

The current situation regarding the novel coronavirus (COVID-19) pandemic has led the educational institutes worldwide to shift their teaching and learning from traditional to online formats.[5] This has proved to be a testing time for developing countries like Pakistan, as many medical institutes were not prepared for such a drastic change in their teaching methodology.[6,7] There was a lack of digital expertise at the universities following traditional On-campus teaching programs. Apart from the technical and financial difficulties encountered the students and faculty faced social and mental health issues.[8]

Case Based Learning (CBL) has always been an active small group learning tool in medical schools.[9] This tool evokes clinical reasoning, critical thinking and problem solving along with building generic skills like communication skills, time management and leadership among the medical students.[10] Active learning occurs when students interact with each other.[11] In HITEC-IMS, Taxila, Case Based Learning has been an effective teaching as well as learning approach for all basic sciences. CBLs used to be organized in 4 to 5 groups where students were provided case scenarios in advance along with their learning objectives. A pre-CBL meeting was conducted before each CBL among faculty members in order to keep the essence of the discussion on the same lines while facilitating the designated groups. The CBL group members assigned their team leader, scribe, and time-keeper. The leader involved all group members in the discussion under supervision and guidance of a faculty member as a facilitator.

The group interactions were marked by the instructor on an assessment form developed by our department which appraised their preparation, hypothesis generation, keywords identification, interpersonal skills and time management as well. A post CBL test followed the dialogue and debate. Such forums conducted in physical classrooms enhance intercommunication and establish equal and just environment for active participation.[11] The pandemic restricted this one-to-one interaction.

At HITEC-IMS, the undergraduate program was in mid-session when the students had to vacate the campus due to COVID-19 pandemic and the whole teaching schedule was shifted online.[12] This shift to online format mandated by the medical institute resulted in transitioning from On-campus to Online CBLs. The utility of this tool is, however, controversial. The data on

studies addressing the effectiveness of online CBL as teaching strategy is scarce.[13] Only a few studies have evaluated the effectiveness of teacher-student interaction and students assessment through online format. The CBL assessment is multidimensional, where students are assessed not only for their knowledge but generic skills like leadership, presentation and communication skills. At HITEC-IMS, the CBL are designed not only for acquisition of learning outcomes but also to achieve these generic skills which is represented in our CBL assessment form (Figure-1). This study will enable us to identify the areas that need improvement in both formats. This study was designed to analyse and compare the perceptions of students regarding both formats of Case Based Learning sessions through feedback and to identify the areas that need improvisation for use in future as an effective learning methodology.

**HITEC-Institute of Medical Sciences**

**CBL ASSESSMENT FORM**

| PHY-form-01 | ISSUE # 01 | ISSUE DATE: 01-12-2020 |
|---|---|---|

CBL number:_____ Session Date : _____ Tutor: _____

Department: _____ Group: _____ Class: _____

Instruction for facilitator: For the CBL session you are conducting rate each student on a scale of 1-5. Minimum marks for each student = 8, Maximum = 40 where 1 = poor, 2 = fair, 3 = fairly good, 4 = good, 5 = very good. Multiply the marks in 4th column with 2.

| | | SUMMATIVE ASSESSMENT | | | | | FORMATIVE ASSESSMENT | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SR # | Student ID/Name | Identification and Explanation of key and new words 1 - 5 | Generates hypothesis and explains mechanism 1 - 5 | Comes prepared with objectives and details of the case 1- 10 | Post-tutorial Test 20 | Total 40 | Manages time 1-5 | Interpersonal skills 1 -5 | Maintains group dynamics 1 - 5 | Provides feedback 1 - 5 | Total 20 |
| 1 | | | | | | | | | | | |
| 2 | | | | | | | | | | | |
| 3 | | | | | | | | | | | |

**Figure-1: CBL Assessment form, HITEC-IMS**

## MATERIAL AND METHODS

This was a cross-sectional descriptive study conducted by Physiology Department, HITEC-IMS, Taxila. The study duration was six months. The sample was obtained through non-probability purposive sampling. Written informed consent from all study participants was taken on consent forms. The study was approved by Ethical Review Board (ERB) of HITEC-IMS. All the undergraduate medical students who attended at least four CBL sessions of both Online and On-campus formats were included in the study. Students who were not willing to participate were excluded. A questionnaire comprising 19 statements related to Online and On-campus CBL sessions was developed by Physiology Department HITEC-IMS and gotten validated from a team of medical educationists.[14] This questionnaire was filled for both Online and On-campus CBL formats.

The statements were designed to assess the Acquisition of knowledge (Q1–Q5), Study skills and Critical thinking (Q6–Q8), Communication skills (Q9–Q13), Presentation skills (Q14 and Q15) and Physical environment (Q16–Q18). Students were also asked for suggestions and future recommendations. Each student had to respond to every statement on a 5-points Likert scale[15] where '1' represented 'strongly disagree' and '5' represented 'strongly agree'. Questionnaires were circulated among the undergraduate medical students of 1st and 2nd year at HITEC-IMS and responses were recorded separately for both formats. Data was analysed using SPSS-28. Likert scale points 1–3 were taken as 'Agreed' (Good Perception), and points 4–5 were included in the 'Disagreed' (Bad Perception) category. Chi-square test was applied, and $p \leq 0.05$ was taken as statistically significant. The results for categorical variables were expressed as percentages.

## RESULTS

A total of 185 responses were received from the students. Among them 94 students belonged to 1st year MBBS, while 91 students were from 2nd year MBBS. From 1st year MBBS 56% respondents were female and 44% were male, while 49% females and 51% males submitted their responses from 2nd year MBBS. The mean age of 1st year students was 19.69 years, and that of 2nd year students was 20.61 years. The percentages of responses for Online and On-campus formats is tabulated as Table-1.

The results revealed the comparison between Online and On-campus Case Based Learning sessions. The communication skills ($p$=0.007) as well as presentation skills ($p$=0.005) conducted On-campus were significant, i.e., more effective as compared to Online mode, while Acquisition of knowledge, critical thinking and physical environment were insignificant (Table-2). Results also showed that respondents recommended On-campus format for future as effective learning strategy which was found significant ($p$=0.001) when both formats were compared.

**Table-1: Individual question responses on the questionnaire (%)**

| Constructs | Question | Online | | On-campus | |
|---|---|---|---|---|---|
| | | Agreed | Disagreed | Agreed | Disagreed |
| Acquisition of Knowledge | 1. The session is useful in making me understand the problem based case scenario | 72.9 | 11.3 | 79.5 | 10.8 |
| | 2. The session has positive impact on learning of applied Physiology | 73.3 | 14.5 | 79.5 | 10.8 |
| | 3. The session has helped me to enhance my retention of knowledge | 69.2 | 13.5 | 78.4 | 9.7 |
| | 4. The session helped me to achieve the learning objectives of CBL in a better way | 69.7 | 11.4 | 79.4 | 8.6 |
| | 5. My queries are better answered by this format | 64.9 | 14 | 74.1 | 10.8 |
| Critical Thinking | 6. The session has helped me to promote critical thinking and reasoning skills | 68.2 | 11.9 | 73.5 | 9.8 |
| | 7. The session has motivated me to study better prior to the session. | 63.8 | 12.4 | 71.9 | 13.5 |
| | 8. This format has improved my self-directed learning skills | 69.7 | 10.3 | 73.6 | 11.9 |
| Communication Skills | 9. This format helped me develop active listening skills | 66 | 13.5 | 76.8 | 12.4 |
| | 10. This format allowed better exchange of ideas. | 66 | 14.6 | 75.7 | 7.1 |
| | 11. This format gives me more chance to interact with each other and the facilitator | 64.9 | 17.2 | 80 | 9.2 |
| | 12. This format has improved my communication skills with peers. | 70.3 | 17.9 | 77.3 | 11.9 |
| | 13. This format has improved my communication skills with teachers. | 58.3 | 18.4 | 75.2 | 9.8 |
| Presentation Skills | 14. This format has improved my self confidence | 62.7 | 11.9 | 75.1 | 11.3 |
| | 15. This format has improved my presentation skills | 65.4 | 14.1 | 75.1 | 10.2 |
| Physical Environment | 16. The physical environment made me more receptive to the session | 64.3 | 14.5 | 73.5 | 13 |
| | 17. Internet connectivity is not a demotivating factor for me | 59.4 | 21 | 65.4 | 17.3 |
| | 18. The environment is less intimidating/Conducive in this format | 61.7 | 14.1 | 64.4 | 16.2 |
| Recommendations | 19. I would like to recommend this format of CBL in future for class | 57.3 | 21.1 | 74.1 | 15.1 |

**Table-2: Comparison of On-campus and Online formats of CBL sessions**

| | Poor perception | Good perception | *p* |
|---|---|---|---|
| ***Acquisition of knowledge and critical thinking*** | | | |
| **On-Campus format** | 25.4% | 74.6% | 0.298 |
| **Online format** | 30.8% | 69.2% | |
| ***Communication skills*** | | | |
| **On-Campus format** | 20.0% | 80.0% | 0.007* |
| **Online format** | 33.0% | 67.0% | |
| ***Presentation skills*** | | | |
| **On-Campus format** | 28.6% | 71.4% | 0.005* |
| **Online format** | 43.2% | 56.8% | |
| ***Physical environment*** | | | |
| **On-Campus format** | 31.9% | 68.1% | 0.101 |
| **Online format** | 38.9% | 61.1% | |
| ***Future Recommendations*** | | | |
| **On-Campus format** | 25.9% | 74.1% | 0.001* |
| **Online format** | 42.7% | 57.3% | |

*Significant

## DISCUSSION

Due to the COVID-19 pandemic the educational institutions shifted to online teaching. In wake of this sudden shift to online format, training sessions of faculty as well as students were conducted at HITEC-IMS prior to commencement of e-learning program to orient them with the new online system involving google classrooms and ZOOM for video conferencing. In this study we assessed the perception of students regarding the Online and On-campus experience of CBL sessions. We compared the two formats in terms of acquisition of knowledge, critical thinking, communication skills, presentation skills and the physical environment.

The data regarding the analysis of interactive teaching methodology such as the CBL is scarce. Our students perceived that both formats were almost equal in terms of acquisition of knowledge and development of critical thinking (74.6% on campus *vs* 69.2% Online). Chi-square test was used to compare the difference between the two formats which was found to be insignificant ($p$=0.298). Majority of the students were satisfied with the online conduct of CBL. This shows that the medical colleges can attain these objectives (acquisition of knowledge and critical thinking) through Online teaching as well. A qualitative study at Monash University, Australia in 2016 gathered responses of 68 students regarding a Remote online (RO)-CBL session where 78% agreed that RO-CBL was effective in reaching their learning objectives.[16] A slight difference in our findings is due to the use of different software used at Monash University, i.e., Google hangouts for RO-CBL[16] whereas we used basic ZOOM for the web based CBL.

There is no one standard method of measuring critical thinking but, there are numerous ways to assess it. Critical thinking can be deemed as a process rather than an endpoint.[17] This emphasizes the need of self-directed learning during CBL sessions[11] We focused this attribute in our study by inquiring about improvement in reasoning skills, motivation to study better prior to the session and improvement in self-directed learning. The students in this study did not show any inclination to a specific format.

Sumandeep Vidyapeeth University in India conducted a non-randomized interventional study on undergraduate medical students of first year to assess their perception of an e-CBL via Google groups. Their feedback was positive and significant ($p$<0.01) for the e-learning approach to CBL as it strengthened their critical thinking and integration with clinical sciences.[13]

Eighty percent (80%) of students in our study agreed that face to face CBL provide more opportunity to communicate with the faculty and peers ($p$=0.007). It presented a healthy environment for discussion in contrast to online conferencing where internet

connectivity issues had been a major setback resulting in frequent interruptions in discussions. This factor thwarted the exchange of ideas, active listening skills and communication with peers and facilitator. The flow of dialogue and discussion was interrupted as the scribe did not have the adequate space and time to perform his task. This compromised the role of the scribe enhancing the communication lag. The study at Monash University provided comparable results in this regard. Some students were uncomfortable to communicate on the e-portal and could not understand the body language of their instructor while others had bad internet connectivity in their region.[16] Social communication makes the foundation for interaction among the peers in a face-to-face environment. If not provided this can prove to be a major disadvantage to online learning. Turning off the cameras in a digital environment lessens the quality of communication among students and faculty. This was pointed out by Public Health students in a questionnaire based study regarding online education after lockdown.[2]

Students at HITEC-IMS believe that presentation skills were improved more with On-campus CBLs compared to Online (71.4% *vs* 28.6%). These cannot be more beneficial on an online format as compared to a real situation where one on one interaction enhances self-confidence and presentation skills.

Although the physical environment contributes to learning and face-to-face interaction allows better understanding, the virtual environment is less intimidating and informal making students relax and more expressive. The students faced challenges during Online learning due to ill-equipped housing situations particularly poor bandwidth which was a huge distraction and lessened their motivation to learn.[2]

The students did not appear to be bothered by their study environment whether it was online or on-campus. The results were insignificant ($p$=0.101) when they were asked to compare the physical classroom environment with a virtual one. They seem to have adapted to the online mode provided that they have good communication and internet connection. A survey was conducted at an Indian University on undergraduate medical students regarding their opinion of online education during the pandemic where 65.9% preferred the face to face format and 39.9% were comfortable with Massive Open Online Courses (MOOCs). They insisted that the online format had a bad impact on their social and mental health while they learned better in a traditional On-campus classroom.[1] Another study on e-learning in India suggested that the online mode does not provide the comfortable environment and social interaction of a face-to-face meeting between students and the teacher or among peers.[18]

More than half (56%) of the respondents ($p$=0.001) in our study favoured the use of face-to-face CBL format in future as they found it more effective for learning and communication, and did not involve the hustle and bustle of internet connectivity and webcam. Some students at Monash University were also of the same view about RO-CBL. Difficulties related to technology and communication gaps in the online format made it less favourable to continue to be used.[16]

A study on e-learning in India suggested that medical institutions should take measures to reduce the gap between the privileged and non-privileged learners considering its not accessible to all.[18]

## CONCLUSION

Both formats are equal for acquisition of knowledge and critical thinking, but the online format falls short in acquiring communication skills and presentation skills.

## LIMITATIONS

Though online format has its benefits it still falls short of accountability and social interaction. Poor internet facilities in remote areas pose a threat to effective management of e-learning. Faculty training in e-learning is also the need of the hour.

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