

Assessment of the Perception of Online Learning in Undergraduate Dental Students: A Questionnaire-based Study

Santosh Mahajan¹ Harsimran Singh Kapoor¹ Chakshu Gandhi¹ Shikha Bansal¹

¹Department of Biochemistry, Baba Jaswant Singh Dental College, Hospital & Research Institute, Ludhiana, Punjab, India

Address for correspondence Dr. Santosh Mahajan, PhD, Department of Biochemistry, Baba Jaswant Singh Dental College, Hospital & Research Institute, Ludhiana 141010, Punjab, India (e-mail: Ritika.raunak@gmail.com).

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Abstract

Introduction Online teaching and e-learning resources were widely used to facilitate learning among students during the COVID-19 pandemic to compensate for the loss of traditional classroom learning.

Material and Methods The study was designed to assess the perceptions and impact of online classes and e-learning resources on first-year undergraduate students of a dental college in Punjab, India, on various aspects of learning biochemistry and their willingness for online classes to be continued in their future academic years.

Results A total of 94 students participated in the survey with 15% males and 85% females. Only 20% of students used e-learning resources to a great extent. The use of e-learning resources decreased among students as the year progressed. More than 80% of students used textbooks and only 14.6% followed e-learning resources to study different topics of biochemistry, and the difference was highly significant at $p = 0.001$. The perception of more than 60% of students that online classes were a good idea in the beginning decreased to about half at the end of the year.

Discussion Although the quality of teaching remained satisfactory for the students, they did not want to study via the online mode in the future as they experienced distractions, reduced attentiveness and motivation to study, and no practical knowledge of the subject due to decreased student–teacher interaction.

Keywords

- ▶ dental students
- ▶ biochemistry
- ▶ online classes
- ▶ e-learning resources
- ▶ classroom teaching
- ▶ COVID-19

Introduction

Offline learning, a traditional classroom teaching method, represents teaching in the pre-internet era. With increasing use of technology in education, online learning (also called Internet-based learning, Web-based learning, or e-learning) has become a common teaching method. The use of online learning has vastly increased since 2012.¹ Many leading universities have developed e-learning material to supplement and enhance teaching.² The effectiveness of online

learning is influenced by many factors³ and could result in low-quality learning materials.⁴

Although both online and offline teachings have been widely used, physical classroom teaching was the common method of teaching in the majority of educational institutes until the spread of the COVID-19 pandemic in India. The World Health Organization (WHO) declared the COVID outbreak a “public health emergency of international concern” on January 30, 2020, and a pandemic on March 11, 2020.⁵ A

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nationwide mandatory lockdown was imposed by the government of India on March, 2020, and was extended further. It affected all aspects of life, including education. Educational institutions, including all health and higher education institutes, were closed to prevent the spread of disease, and the students were stuck at home.^{6,7}

To ensure that the academic curriculum of the students does not become another victim of the virus, teaching via the online mode was started in all education institutes, including medical and dental colleges. Apart from delivering lectures and demonstrations, online classrooms were also used for conducting formative and summative assessments.

Since there was a sudden transition from the time-tested classroom to an extremely novel method of teaching and training, the objective of the study was to assess the perception of first-year undergraduate dental students towards learning biochemistry via the online mode and its comparison with the offline teaching they were having before the COVID-19 outbreak.

Materials and Methods

Biochemistry is one of the subjects taught to undergraduate dental students in their first year of academic life. The students enrolled in the study were receiving classroom instructions before the COVID outbreak. However, during COVID-19, all lecture presentations and assignments were made available to students on Zoom and Google Meet. The study was conducted at the end of their academic session in January 2021 using a questionnaire from the literature⁸ with a few modifications. The responses of the students to various questions were tabulated in MS Excel, and their percentage was calculated. The data were statistically analyzed using Student's *t*-test.

Results

The study consisted of 94 students, of which 85% were females and 15% were males (►Fig. 1A), of the age group 18 to 21 years (mean age \pm standard deviation [SD]: 20.2 ± 0.65 years). Among the participating students, 56%

were using e-learning resources before the pandemic with percentage of females 24% higher than that of males.

During online classes, only 20% of students used e-learning resources to a great extent. The majority of the students (68%) were moderate users, while only 8% used it to the minimum extent and 4% used only the web material to study. The majority of the students (40%) preferred to use e-learning resources once or twice a week. These resources were used by only 27 and 19% of the students before the class test and the final examinations, respectively. Both males (71%) and females (60%) claimed the usefulness of e-learning material to a moderate extent (►Fig. 1B).

The use of e-learning resources decreased to 42% as the year progressed. It increased in 36% of the students, while it remained unchanged in 22% (►Fig. 2A).

Students were asked about the learning materials they followed to study biochemistry. More than 80% (86.2%) of students used textbooks and only 14.6% followed e-learning resources to study different topics of biochemistry, and the difference was highly significant at $p < 0.001$ (►Table 1).

The authors also analyzed the impact of online classes on the attitude of the students toward different aspects of learning and their motivation to study the subject during the course of the year (►Fig. 2B). As determined by the percentage of the students, it was found that students showed a negative attitude toward the online classes and used textbooks to study.

When asked about the quality of online classes and e-learning materials, about half of the students (51% females and 43% males) found the quality of online classes and e-learning material satisfactory; 30% found them good and 20% found it barely satisfactory. Only approximately 10% of students found the web material excellent (►Fig. 3A).

The perception of the students (71% males and 60% females) about online classes being a good idea in the beginning decreased to about half at the end of the year, as greater than 50% students did not agree with this. The percentage of students (12.3%) who perceived online classes as a bad idea initially increased to double (26.3%) as the year progressed (►Fig. 3B).

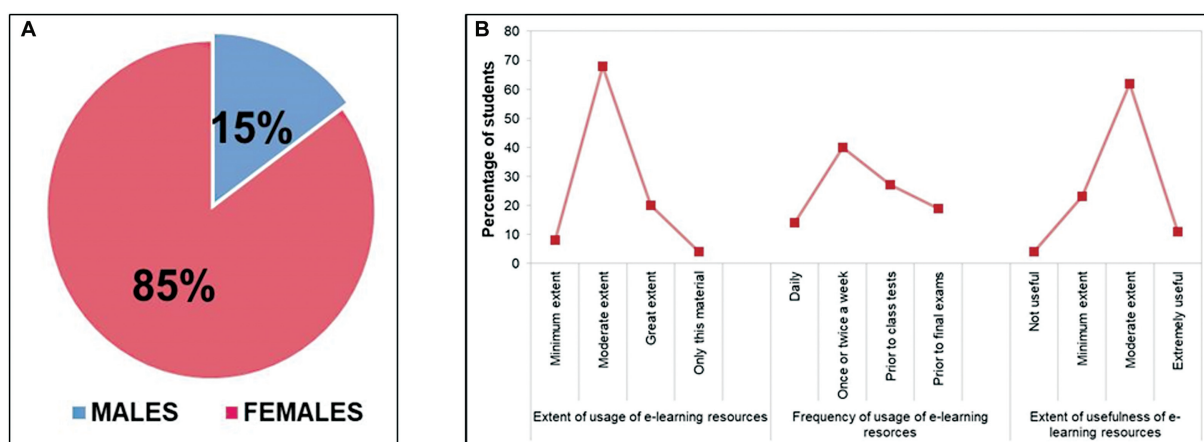


Fig. 1 (A) Percentage distribution of students. (B) Frequency of usage and rating of e-learning resources.

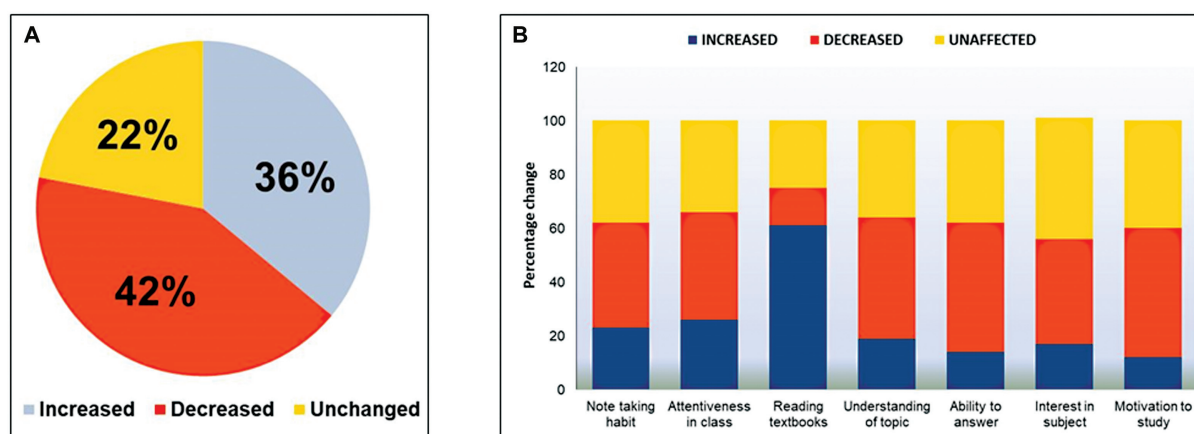


Fig. 2 (A) Usage of e-learning resources as the year progressed. (B) Impact of online classes on the attitude and motivation of the students.

Students were also asked about their preferred mode of learning and whether online classes should be continued in their future years of dentistry. The majority of the students (~50%) claimed classroom teaching as their preferred mode of learning and did not want online classes to be continued in future years. However, 33% of students wanted both modes of learning to enhance and update their knowledge (→ **Fig. 3C, D**).

About 90% of students comprehended in favor of online classes as they are comfortable, time-saving, and have the benefit of recording lectures and revising them later if they happen to miss the class. But more than 90% of students

disliked the online classes as they faced network issues and also lacked practical skills. More than 60% of students claimed decreased motivation to study and inattentiveness in the class due to reduced student–teacher interaction, increased stress to cope with the syllabus, and more distractions during online classes (→ **Table 2**). They also complained of difficulty clearing doubts and felt that the e-learning resources were subpar compared with the traditional classroom teaching method. They wanted online classes to be continued only if a suitable e-learning platform was established at the institute.

Table 1 Preference of the study material used by students to study biochemistry

Chapter	Key/% of students					
	1	2	3	4	5	6
Topic 1: enzymes	10	2	1	1	0	0
Topic 2: carbohydrate metabolism	6	2	5	1	0	0
Topic 3: lipid metabolism	5	7	1	0	1	0
Topic 4: protein metabolism	3	5	0	2	4	0
Topic 5: molecular biology	7	5	1	1	0	0
Topic 6: water and electrolyte balance	6	3	0	3	1	1
Topic 7: regulation of pH	5	3	4	0	2	0
Topic 8: minerals	6	4	0	1	1	2
Topic 9: oxidative phosphorylation	6	3	2	3	0	0
Topic 10: hormones	5	4	2	1	2	0
Topic 11: carcinogenesis	4	3	4	3	0	0
Topic 12: nutrition	7	3	0	4	0	0
Topic 13: function tests	6	3	1	2	2	0
Topic 14: miscellaneous topics	5	5	1	2	1	0
Total students	81	52	22	24	14	3
% students	86.1702128	55.31915	23.4042553	25.531915	14.8936	3.1915
p value	< 0.001 ^a					

Note: 1 = textbooks only; 2 = mainly textbooks with minimum use of e-learning Web site; 3 = equally from textbooks and e-learning Web sites; 4 = mainly from e-learning Web site; 5 = only from e-learning website; and 6 = only class notes.

^aSignificant difference at $p < 0.001$.

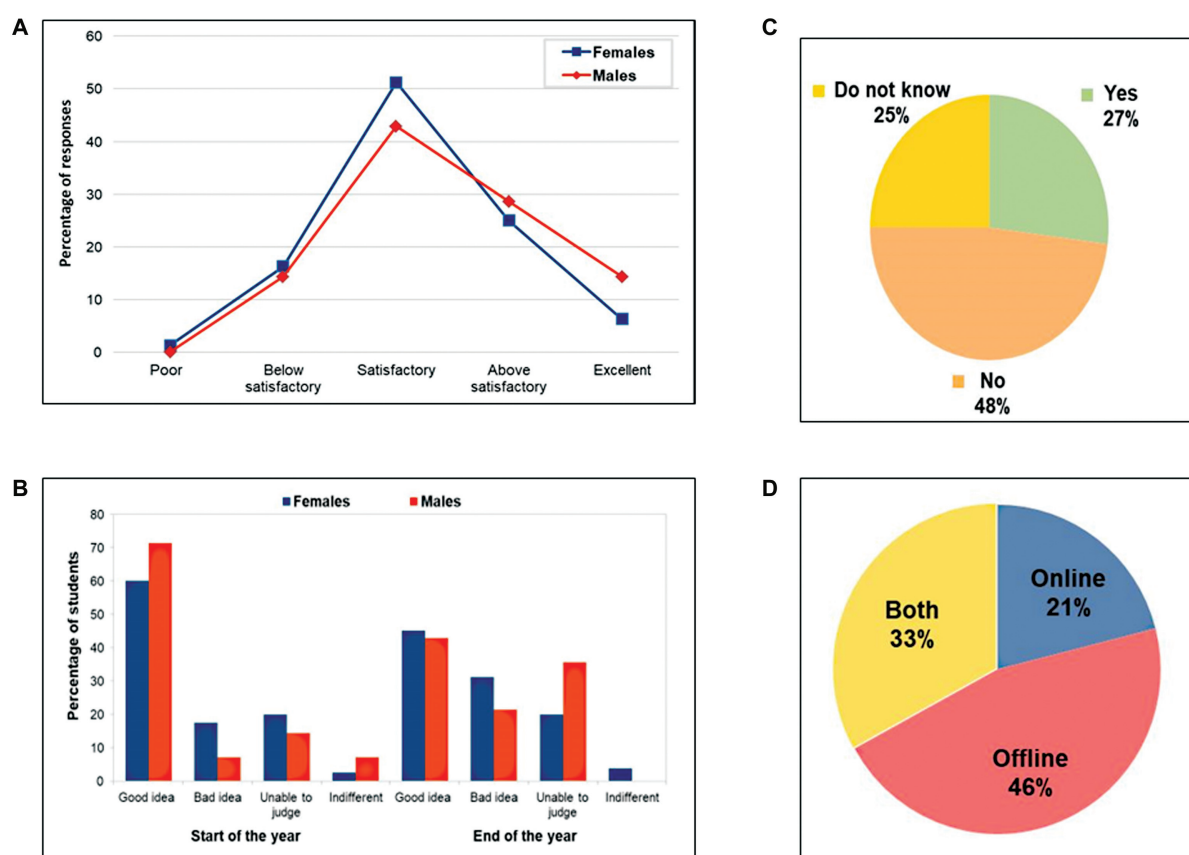


Fig. 3 (A) Overall quality of the biochemistry content on the e-learning web sites. (B) Perception of students regarding online classes at the start versus at end of the year. Percentage response of students to the questions: (C) “Should online classes be continued in future years?” and (D) “Which is your preferred mode of learning?”

Table 2 Students’ comprehension of online classes

Liking/points in favor	Females, n (%)	Males, n (%)	Total, n (%)
Ease and comfort	74 (93%)	11 (79%)	85 (90%)
Record and revise lecture	76 (95%)	9 (64%)	85 (90%)
Time-saving	72 (90%)	13 (93%)	85 (90%)
Disliking/points against	Females, n (%)	Males, n (%)	Total, n (%)
Network issue	76 (95%)	10 (71%)	86 (91%)
Lack of clarity of doubts	44 (55%)	8 (57%)	52 (55%)
Inattentiveness	48 (60%)	9 (64%)	57 (61%)
Poor quality of material	32 (40%)	5 (36%)	37 (39%)
Lack of practical knowledge	73 (91%)	12 (86%)	85 (90%)
Distraction	62 (78%)	7 (50%)	69 (73%)
Stress to cope up	55 (69%)	6 (43%)	61 (65%)
Decreased teacher–student interaction	59 (74%)	5 (36%)	64 (68%)

Discussion

The present study revealed that in the era of technology, even though the students are highly dependent on the web for every bit of information and knowledge, they considered classroom teaching the better mode of learning and did not

want online classes to be continued in the future years of their dentistry. The percentage of students who were excited about online classes initially decreased as the year progressed. The fall is attributed to decreased student–teacher interaction during online classes they faced, leading to less understanding of the topic and inattentiveness in the class. In

distance learning, the ability of the student to self-monitor, evaluate the contents accurately, and request help accordingly affects learning. Also, the instructors lack direct access to verbal and nonverbal feedback from their students.⁹ It is believed that high quality and frequency of student–teacher interaction are required to have a successful distance learning experience.¹⁰ Further, student–student interaction includes collaborative learning that can help develop critical thinking skills and more in-depth knowledge,¹¹ which are lacking in online modes of teaching. Conventional lecture-based teaching is considered the best way to deliver a considerable amount of information to a diverse and large group of students.^{12–14} However, the quality of lecture depends on the experience and skill of the teacher, which are quite variable.¹⁵

The habit of taking notes during lectures is a useful strategy that many students use for learning, as it keeps them attentive and helps them save time by referring to different books to get adequate information on a particular topic.^{16,17} We found that the students' note-taking habits and attentiveness during online classes decreased in 39 and 40% of the students, respectively, leading to decreased understanding, ability to answer the question, and motivation to study the subject. In a similar study done earlier, the habit of taking notes during lectures was found to decrease in 36% of the students, but attentiveness increased in 29% of the students.¹⁶

Books are said to be a person's best friend as they do not ask for any favor and give all that they have to offer, provided the person is devoted enough to grab them all. During the COVID-19 pandemic and lockdown, some students were happy as education had stepped up on the technological platform and they could study while being in the comfort of their beds, yet there were some students who still preferred books over online studies. The habit of reading textbooks is an important aspect of self-directed learning.¹⁵ Dependence on e-learning resources as the sole source of information on a topic may limit the knowledge acquired by students to the bare essentials required to pass examinations. In the present study, 86.2% of students used textbooks and only 14.6% followed e-learning resources to study different topics of biochemistry, and the difference was highly significant at $p < 0.001$. In a previous study in the literature,¹⁸ 42% of students declared that their dependence on textbooks to learn biochemistry decreased as a result of having access to e-resources. Although they claimed more attentiveness in the class and more understanding of the subject, the authors did not find significant differences in the performances of the students in the final summative examination at the end of the course.

Various studies done earlier on online learning concluded a significant advantage for online learning over traditional methods,¹⁹ no significant difference between the two methods,²⁰ a significant advantage for traditional methods,²¹ or that online learning should be considered a supplement to learning rather than a replacement for traditional teaching methods.²² These variations could be explained by the differences in research methods, quality of online contents, learning environment, teachers' expertise in online teaching, or students' attitudes. About 70% of students preferred a com-

ination of both teaching methods, and the preference was attributed to gender, age, academic achievement, brain processing, culture, and creative thinking.²³ In the present study, only 33% of students opted for a blended mode of teaching.

Conclusion

The participating students in the current study did not perceive online classes to be a good idea, as it initially appeared for teaching professional students, as they failed to offer practical hands-on skills and the students were more distracted than focused during the lecture, leading to lack of in-depth knowledge of the subject. Therefore, it is crucial to underline that textbooks and regular student–teacher interactions should continue to be the primary source of education and that e-learning materials and online classes can only be used as supplemental learning tools.

Conflict of Interest

None declared.

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