



Survey of Student Satisfaction with Online Biology Course

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Abstract. The global SARS-CoV-2 pandemic and the resulting lockdown has led to the closure of all education institutions in an effort to contain transmission of the infection and students inevitably switched to online learning. Students were faced with the new challenge of adapting to virtual lessons in order to optimize continuous education during times of crisis. We aimed to assess satisfaction level of university students with online and in-class biology course. We used a cross-sectional study design, and collected data using a questionnaire. Total student satisfaction level with biology course was rated high. The instructor's online lesson teaching methods scored the highest (4.41 ± 0.089), while virtual instruction scored lower (4.24 ± 0.84). Instructors were significantly better at interaction with students, preparation of lessons, and student evaluation for in-class lessons. Therefore, instructors need to communicate better with students, improve their lessons, integrate good teaching techniques, and sustain an interactive environment during online classes.

Keywords: Online learning · Teaching method · Student satisfaction

1 Introduction

The global coronavirus disease 2019 (COVID-19) pandemic and the closure of educational institutions have immensely disrupted the learning activities of 850 million students in 60 countries and interrupted program curriculums. In order to adapt to the unprecedented changes, many countries responded by taking alternative measures to support the education system and maintain the continuation of learning activities [1–3]. Virtual libraries, television programs, guidelines, digital content, video lectures, and online channels were newly introduced in at least 96 countries [4]. Many regions offered virtual education to students by switching to television channel programs and using online platforms such as Zoom, Skype, Facetime, Google class, and Google Meet [5, 6]. For example, on February 6, 2020, the Ministry of Education of the People's Republic of China launched initiatives to intensively support and improve the capacity of e-learning platforms and to adopt appropriate methods to facilitate teaching [7].

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According to the United Nations Educational, Scientific, and Cultural Organization (UNESCO), 186 countries have temporarily shut down educational institutions, and 73.8% of new admissions were enrolled in virtual learning by April 2020 (UNESCO, 2020) [8]. Although the motive behind lockdowns and public restrictions is to effectively reduce the risk of COVID-19 transmission and decrease prevalence, the closure of educational organizations disturbs established learning methods among students and negatively affects their social engagement [9, 10]. During the challenging times of the COVID-19 pandemic, students were required to adapt to new learning methods using technology to ensure continuous education. Therefore, it was necessary to evaluate student satisfaction with e-learning, specifically in a biology course.

Due to the pandemic COVID-19 and its resultant lockdown, classes in kindergartens, secondary schools, and universities were moved online. As virtual learning became mandatory, both students and teachers had to adapt to the new challenges not only in Mongolia, but also in many other countries [9, 10, 14]. In particular, online instruction has been associated with excessive computer use, inability to fully participate in class due to internet speed and capacity, inability to establish face-to-face communication with instructors, and inaccurate assessment of progress [11]. Examining the impact of this sudden change in the delivery of education on student learning and satisfaction level is critical, particularly to compare to traditional classroom instruction. In the academic year 2019–2020 and during the COVID-19 pandemic, the Department of Biology conducted 32 h of lectures and 64 h of biology practice lessons, which allowed them to gain some experience in online teaching. Therefore, the Department of Biology in the School of Biomedicine at Mongolian National University of Medical Sciences (MNUMS) conducted a survey on student satisfaction with the online biology course and in-class course.

2 Data Collection and Limitations

The cross-sectional study was conducted from February 16, 2020 to December 16, 2021 and a questionnaire was developed at the Department of Biology, Mongolian National University of Medical Sciences (MNUMS). First-year undergraduate students participated in the study after completing their biology courses. In total, this survey covers 844 students. Out of which 434 students studied during the academic year 2019–2020 and attended virtual courses (i.e., Google Meet, Google Classroom), and 410 students studied during the academic year 2020–2021 and 26 groups of students attended in the traditional face-to-face classes. A self-structured questionnaire developed according to the principles of Course Learning Outcomes (CLO) was used to collect data on student satisfaction. The taxonomy-based questionnaire consisted of 2 sections and 10 items with a 5-point likert scale ranging from 1–5 (1-very poor, 2-poor, 3-moderate, 4-good, 5-excellent) (Table 1.)

Stata version 16 (IBM corp, USA) was used to analyse the data according to the study objectives and hypotheses. In descriptive analysis, the mean, standard deviation, confidence interval (CI), frequency, and percentage were calculated. Student's t-test was performed to determine the difference between the numeric variables and the chi-square test for categorical variables. The statistically significant difference between the means

Table 1. Feedback survey questionnaire content

Variable	Questionnaire
I Evaluation of teaching methods of the instructor	
BI	Evaluation of instructor's online lecture
BII	Assessment of instructor's acquirement of teaching methods
BIII	Does the instructor make connections between topics and between lessons?
BIV	Assessment of instructor's online class and in-class lesson
BV	Assessment of the instructor's prepared lesson
BVI	Assessment of the instructor's preparation for the online lesson
II Student and instructor interaction	
CI	The attitude and communication of the instructor toward the students
CII	Instructor's fairness when evaluating students
CIII	The instructor's influence on the students' learning methods
CIV	The instructor communicates transparently with all students.
CV	Delivery of the lesson according to the syllabus
CVI	Time management of the instructor

was confirmed with 95% CI. A p-value of less than 0.05 was considered statistically significant.

Limitations of our study include the cross-sectional design and the lack of a causal relationship, and we did not address students' sociodemographic data. Further, convenience sampling was used to sample accessible students. In addition, we did not measure potential barriers to online learning such as technical difficulties, acquired knowledge and skills, mental and social support, and preference for online or classroom lessons. In addition, the survey questions were developed by the Biology Department and were not tested for validity or reliability. Finally, the results may not be generalizable to students in other grade levels taking other courses. Therefore, future studies should measure satisfaction levels of students in other grade levels and students taking other courses.

3 Results

Satisfaction with classroom biology instruction (2020–2021) was higher among first-year undergraduate students (4.36 ± 0.08) than with virtual instruction (2019–2020), with a score of 4.24 ± 0.84 (95% ci, 0.38–0.25; $p = 0.0015$) (Table 2).

The mean for the instructor's online lesson teaching methods was 4.41 ± 0.089 , or 84% ($p = 0.001$), indicating high or very high satisfaction. The mean score for student-instructor interaction was 4.38 ± 0.12 or 87.36% ($n = 746$), indicating high satisfaction.

Previously, a survey of 3,153 students conducted by the Department of Undergraduate Education Policy and Coordination at MNUMS found that 86% of respondents were

Table 2. Comparing satisfaction levels of first-year undergraduate students in online and in-class Biological lessons

Question	Online lesson ^a (n = 434)	In-class lesson ^a (n = 421)	P-value
Student satisfaction	4.244 ± 0.84	4.36 ± 0.08	p = 0.0036
Instructor's teaching methods	4.335 ± 0.11	4.49 ± 0.068	p = 0.001
Student-instructor interaction	4.351 ± 0.11	4.41 ± 0.14	p = 0.001
Instructor's attitude and communication	4.442 ± 0.84	4.60 ± 0.67	p = 0.002
Instructor's lesson preparation	4.48 ± 0.17	4.58 ± 0.47	p = 0.001
The instructor's influence on the students' learning methods	4.16 ± 0.80	4.24 ± 0.90	p = 0.16
Instructor's fairness when evaluating students	4.11 ± 0.09	4.19 ± 0.16	p = 0.001
Coursecurriculum, content, syllabus accessibility	4.32 ± 0.67	4.22 ± 0.37	p = 0.0073

^aNumerical variables expressed in mean and standard deviation

satisfied with online learning and 14% were dissatisfied [12]. Our study found that the average student satisfaction rate with online learning was high and students considered virtual education a viable option during the pandemic. The results are greater than a previous study examining the satisfaction with general online lessons [13], in which students rated the outcomes of online learning as satisfactory (4.08). In addition, students rated the accessibility of the biology course curriculum, content, and syllabus as 4.32 ± 0.67 , which is consistent with the conclusion that appropriate teaching methods and materials support instructor-learner interaction and reduce the burden of online instruction.

The fact that the majority of our respondents rated online biology instruction as excellent or good is consistent with the findings of previous international studies [3, 4, 7]. They reported that instructor involvement and interactive teaching methods were important factors in student satisfaction and the effectiveness of the online learning environment [7, 13, 14]. In addition, a survey conducted by the Communication Skills Department at MNUMS found that online learning saves time, reduces costs, allows students to review prepared course materials, improves self-regulated learning, concentration, note-taking, and writing skills [15].

Our findings implicate that students prefer traditional face-to-face classes than online classes. Instructors should be advised to develop new strategies to maintain positive and interactive communication with students during online courses and prepare lessons accordingly. The lessons we learned about virtual learning during this pandemic will be useful in future emergency situations [2, 10, 13]. Providing quality educational services

is a priority for every university [9, 16]. Therefore, further attention is needed to ensure that the results have a positive impact on learning outcomes.

4 Conclusion

The global pandemic of COVID-19 has impacted education and virtual learning has peaked. This study aimed to assess satisfaction level of university students with online and in-class biology course. According to the results of the study, the in-class biology course has been considered more satisfying to students compared to online classes as the instructor evaluation scores were significantly higher. On the other hand, course syllabus and learning material availability were rated higher for online classes. The universities can improve level of the education by improving instructor's skills to communicate with students online, integrating different teaching techniques, and maintaining an interactive approach to keep up with the traditional classroom courses.

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Authors' Contributions. M.T designed and supervised the study; A.B and G.N collected data; M.T, G.A, A.Z, and N.M wrote the manuscript, A.Z developed the questionnaire; B.M, T.D, and A.B conducted statistical analysis; N.M interpreted data and edited the manuscript.

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