Pharmacy Education (2023) 23(1) 321 - 328
https://doi.org/10.46542/pe.2023.231.321328

RESEARCH ARTICLE

Comparison of pharmacy student survey results: Student perceptions of face-to-face and online lectures during the COVID-19 pandemic

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Keywords
COVID-19
Education
Face-to-face
Online
Pharmacy
Student perception

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Abstract

Background: The purpose of this study was to compare the results of student surveys obtained in 2021 and 2022 to assess the changes in student satisfaction levels and perceptions of face-to-face versus online lectures during the pandemic. **Methods:** A survey was conducted at Kitasato University in Japan using a questionnaire to help assess the most preferred lecture style for students and their level of satisfaction with online lectures. **Results:** In 2021, 81.7% of participants responded that they preferred online lectures. Although most courses returned to a traditional classroom setting in 2022, only 10% of students reported preferring face-to-face lectures, with an increasing number of somewhat dissatisfied participants. However, many students were satisfied with on-demand video lectures for review and hoped that these would continue to be available after the pandemic. **Conclusion:** Student expectations of online classes seem to have been met. Students preferred more flexibility and choice in lecture style. In the future, consistent scheduling and lecture styles will be essential factors in student satisfaction and engagement with their studies.

Introduction

The ongoing COVID-19 pandemic has impacted education around the world. On April 7, 2020, the Japanese government declared a nationwide state of emergency (Prime Minister's Office of Japan, 2020a, 2020b), and most schools restricted students from entering campuses in the first half of the 2020 academic year, which in Japan runs from April to the following March. At Kitasato University, Tokyo, Japan (KU), the School of Pharmacy had to quickly adapt to a new way of teaching by reformatting all coursework from physical to virtual, offering livestream lectures through video conferencing platforms, such as Zoom (Zoom Video Communications, Inc., San Jose, California, USA) and using document collaboration systems such as Google Docs. Furthermore, KU used a learning management system (LMS) to upload reading materials and presentations and recorded video lectures for the students to access at will.

In 2021, the Japanese Ministry of Education, Culture, Sports, Science, and Technology (MEXT) recommended that universities resume face-to-face lectures under appropriate infection prevention measures. Therefore, KU decided to implement a hybrid decentralised learning model in the 2021 academic year. The model meant that half of the students would take face-to-face lectures, and the other half, who were off-campus,

would take online lectures via live stream or recorded on-demand video lectures, depending on the course. As such, student schedules were modified, rearranged, and delayed according to the COVID-19 infection status and notifications from MEXT. The faculty members had to prepare both face-to-face and online lectures just in case of a state of emergency. Indeed, the Japanese government declared pre-emergency measures in Tokyo between April 12, 2021, and April 24, 2021, then a new state of emergency between April 25 and June 20, 2021. In spring 2022, pre-emergency measures were lifted, and MEXT released a notice for universities to resume face-to-face classes (Ministry of Education, Culture, Sports, Science, and Technology, 2022). Most classes at KU returned to a traditional classroom setting, except that students were divided into two classrooms to maintain social distance and avoid the spread of COVID-19.

Online lectures require a good communication environment, and Japan is one of the countries with an internet penetration rate of more than 90% (Ministry of Internal Affairs and Communications, 2022). In addition, KU provided personal computers to all students in the first year to make laboratory exercises more efficient. Teaching at KU was entirely face-to-face on campus before COVID-19, but the pandemic precipitated the integration of information and communication technology. Most students had limited experience with online learning and had to adapt to new learning environments. Hence, there was a concern about how this change would affect their learning experience. Some studies have reported that offline and online learning environments are equivalent (Porter, Pitterle & Hayney, 2014; Paul & Jefferson, 2019); however, a recent systematic review of the perceptions of pharmacy students of e-learning during the pandemic revealed that about half of the participants had positive perceptions of online classes (Pires, 2022). Although numerous studies around the world have examined the effectiveness of online education and student satisfaction during the COVID-19 pandemic, the results are mixed (Porter, Pitterle & Hayney, 2014; Salter *et al.,* 2014; Paul & Jefferson, 2019; Pei & Wu, 2019; Cong, 2020; Hussain *et al.,* 2021; Naciri *et al.,* 2021; Atwa *et al.,* 2022; Pires, 2022). Therefore, this study aimed to compare the student surveys obtained in the 2021−2022 and 2022−2023 academic years to assess the pharmacy students' opinions, levels of satisfaction, and perceptions of face-to-face versus online lectures during the pandemic. Improving our understanding of the factors affecting their preferences could help develop better pharmacy school programmes in the future.

The transition of lecture styles at KU during the pandemic

During the first term of the 2020 academic year, all lectures were pre-recorded and made available as on-demand videos on the KU platform. Because of the sudden onset of the pandemic, faculty did not have any flexibility in selecting a course style. However, in the first term of the 2021−2022 academic year, KU school policy allowed for greater flexibility, and a hybrid teaching model was implemented. For example, in the Drug Information course, half of the students attended face-to-face lectures, while the other half participated in livestreaming lectures via Zoom. All Zoom lectures were recorded and made available as on-demand videos from the following day of the face-to-face class. The reason for the time lag in streaming the lectures was to edit the recorded lectures. In cases where students could not attend a face-to-face class due to special needs, illness, or excused absence, their attendance was recorded by listening to either the on-demand videos or the livestreamed lectures. In short, all students could watch on-demand video lectures for review. Questions from students were addressed after class due to the large number of students (over 250). In addition, regular communications channels were also available by email, Zoom chats, and the KU LMS platform.

In the middle of the term, the Japanese government declared a nationwide state of emergency again; therefore, all lectures were moved online except for the experiential courses such as laboratory practices. The rest of the lectures in the Drug Information course were distributed via Zoom, and the recorded video lectures were streamed starting from the following day of the original schedule.

In the first term of the 2022 academic year, face-to-face lectures were the primary mode of instruction. On-demand video lectures were also delivered to students infected with COVID-19 or those who had been in close contact with an infected person and had to stay home. Livestreaming of lectures was no longer offered as attending face-to-face lectures became mandatory.

Methods

Course description

The Drug Information course is a required one-credit hour course held for ten consecutive weeks for 1.5 hours per class in a traditional classroom setting during the first term of the fourth academic year of the six-year B.S. Pharmacy programme at KU. The course covers the fundamentals of drug information practice,

an introduction to various drug information resources, a systematic approach to inquiry, and introductory concepts about evidence-based medicine. The Drug Information practicum is a separate course. Several approaches were implemented in the online lectures to ensure student retention of knowledge. The lectures included a five-minute quiz on Google Forms, and the scores and answers were returned to students using a Google Forms feature. In addition, review questions were included in the lecture handouts, and case study assignments were provided to all students.

Study design

An online survey was conducted at KU with fourth-year pharmacy students who had registered for the Drug Information course during the first term of the academic years 2021−2022 and 2022−2023. Of the courses at KU, only the Drug Information course offered three different lecture styles, so this survey was limited to students enrolled in this course. A total of 270 students were invited to participate in the academic year 2021−2022, compared to 260 students in 2022−2023. Participation was voluntary, and participants were notified on the questionnaire that all data collected would be kept confidential.

A web platform, Google Forms, was used to develop the online questionnaire, which included a mixture of multiple choice, Likert-scale, and open-ended questions. By the end of the first term, a document comprising of an explanation of the survey and a QR code to access the web page of the Google Form was developed, and invitations to access it were posted on the university website. The QR code was also printed on the last page of the lecture handouts given to the students.

To ensure the anonymity of responses, no identifying information, such as email address, gender, or age, was collected. The questionnaire included the following core questions: (1) what was the best lecture style during the COVID-19 pandemic; (2) reasons/comments for selecting (1); (3) what was the level of satisfaction with the online lectures; (4) reasons/comments for selecting (3). The environment at home when listening to the livestreamed lectures was investigated in the 2021−2022 survey. Changes in student learning behaviours were examined in the 2022−2023 survey, compared to the previous year after shifting from online lectures to face-to-face classes.

Google Forms were used to collect data, and Microsoft Excel was used for the descriptive statistical analysis. Unless otherwise specified, results were reported as counts and percentages. The quantitative responses measured on multiple choice and 4-point Likert scales were also summarised with descriptive statistics. The qualitative component of the survey was analysed using thematic analysis to identify prominent themes addressing students' perceptions and preferences regarding their lecture experience during the COVID-19 pandemic.

Ethical considerations

This study was reviewed by the Kitasato University Institutional Review Board and found to be exempt from full review.

Results

A total of 115 students (42.6%) completed the 2021 survey, which was conducted under a state of emergency, and none of the students had been vaccinated at that time. In 2022, 96 students (36.9%) completed the second survey, which was carried out after COVID-19 vaccines had become available, although KU did not make vaccination mandatory for students attending lectures.

Table I presents a comparison of the distribution of lecture style preferences between the academic years 2021−2022 and 2022−2023. The 2021−2022 survey results showed that most participants preferred either on-demand video lectures/livestreaming lectures or both on-demand videos and livestreaming lectures (81.7%). Eighteen participants chose both on-demand video and face-to-face lectures (15.7%), and three students preferred face-to-face lectures (2.6%). In the 2022 survey, 75 out of 96 (78.1%) preferred both on-demand video and face-to-face lectures, and 10 out of 96 (10.4%) preferred face-to-face lectures. No students preferred livestreaming lectures only.

Table I: Lecture style preference distribution by percent

Lecture Style	2021-2022 (n=115)	2022-2023 (n=96)
(1) On-demand video lectures	44 (38.2%)	9 (9.4%)
(2) Livestreaming lectures	10 (8.7%)	0 (0.0%)
(3) Face-to-face lectures	3 (2.6%)	10 (10.4%)
(4) Livestreaming lectures and on-demand video lectures	40 (34.8%)	2 (2.1%)
(5) Face-to-face lectures and on-demand video lectures	18 (15.7%)	75 (78.1%)

Table II shows a comparison of the reasons for the preferred lecture style between the academic years 2021−2022 and 2022−2023. The most common reasons participants chose on-demand video lectures were the greater flexibility in when and how they studied,

decreased risk of COVID-19 infection, and increased time to study due to the elimination of commuting time. In the 2021 survey, 11 participants indicated their preference for the 2020 lecture style, which was characterised by consistency across all lectures and distribution of the recorded video lectures along with the course schedules on the syllabus. The most cited reasons for preferring livestreamed lectures were the ability to keep up with classes and the reduced risk of COVID-19 infection. Among those who chose face-to-face lectures, five students answered that they were more focused on their learning, and two reported that they could get more support from instructors. The majority of those who preferred livestreaming and on-demand video lectures were from the academic year 2021−2022. The main reasons for this preference included the ability to keep up with classes by regularly listening to the lecture and the use of on-demand video lectures for review while avoiding COVID-19 infection. According to the results of the 2022 survey, more participants expressed a preference for both on-demand video and face-to-face lectures compared to the 2021 survey. The main reasons cited for this preference were the need for on-demand video lectures for review, the need for on-demand video lectures in cases of emergencies, such as illness or internet connectivity issues, and the greater flexibility in when and how to study.

Table II: Comparison of reasons for preferred lecture styles between 2021–2022 and 2022–2023

	Categorised student feedback	2021–2022	2022–2023	Total
(1) On-demand	Allow more flexibility when and how to study (students can select their best style to study)	20	2	22
	Reduce the risk of COVID-19 infection/prevent COVID-19 infection	8	4	12
	Prefer consistent lecture styles for all courses	11	0	11
	More time to study/no commuting time	4	2	6
	Less concern about internet troubles compared to the livestreaming lectures	6	0	6
	Be able to concentrate on my learning	1	3	4
	Need on-demand video lectures for review	3	0	3
(2) Livestreaming	Be able to keep up with the classes (listen to the lectures on schedule)	7	0	7
	Reduce the risk of COVID-19 infection/prevent COVID-19 infection	5	0	5
	Be able to concentrate on my learning	3	0	3
(3) Face-to-face	Be able to concentrate on my learning	1	4	5
	Be able to receive printed handouts	0	2	2
	Be able to receive more support from an instructor	1	1	2
	Be able to keep up with the classes (listen to the lectures on schedule)	0	2	2
(4) Livestreaming + on-demand	Be able to keep up with the classes (listen to the lectures on schedule)	23	0	23
	Need on-demand video lectures for review	18	0	18
	Livestreaming lectures are better than face-to-face lectures for safety	7	0	7
	Need on-demand video lectures in case of emergency	7	0	7
	Reduce the risk of COVID-19 infection/prevent COVID-19 infection	5	1	6
	Be able to concentrate on my learning	2	1	2
(5) On-demand + face-to-face	Need on-demand video lectures for review	1	33	34
	Allow more flexibility when and how to study (students can select their best style to study)	7	16	23
	Need on-demand video lectures in case of emergency	1	21	22
	Reduce the risk of COVID-19 infection/prevent COVID-19 infection	2	8	10
	Less concern about internet troubles compared to the livestreaming lectures	5	0	5
	Negative learning environment on campus (some students are chatting)	0	4	4
	Face-to-face lectures increase my motivation to study.	0	4	4
	Be able to keep up with the classes (listen to the lectures on schedule)	0	3	3
	Face-to-face classes are able to regulate my life	0	3	3
	Be able to concentrate on my learning	1	1	2
	Prefer consistent lecture styles for all courses	2	0	2

Note. Reasons for the total number of more than two were selected. Some students provided multiple reasons

Regarding the learning environment at home during the 2021−2022 academic year and the implementation of livestreaming lectures via Zoom, among the 115 survey participants, 42 (36.5%) reported no problems, 19 (16.5%) experienced network problems, and 12 (10.4%) had some difficulties with their surroundings.

Table III presents a comparison of satisfaction levels with online classes between the 2021−2022 and 2022−2023 surveys. In the 2021−2022 survey, 59 participants declared feeling somewhat satisfied (51.3%), while 38 participants reported being satisfied (33.0%). Although the rate of participants who reported feeling somewhat satisfied was similar in the 2022−2023 survey (51.0%), there was an increase in the proportion of those who stated being somewhat dissatisfied or dissatisfied (13.9% vs 24.0% and 1.7% vs 6.3%, respectively).

Table III: Comparison of satisfaction levels with online lectures between 2021–2022 and 2022–2023

Level of satisfaction	2021–2022 (n=115)	2022–2023 (n=96)
Satisfied	38 (33.0%)	18 (18.8%)
Somewhat satisfied	59 (51.3%)	49 (51.0%)
Somewhat dissatisfied	16 (13.9%)	23 (24.0%)
Dissatisfied	2 (1.7%)	6 (6.3%)

Table IV shows the level of satisfaction with online classes, where student comments are categorised by type of reason. In 2021−2022, participants who were somewhat satisfied or somewhat dissatisfied cited a preference for on-demand video lectures streamed according to the same schedule on the syllabus for a more consistent lecture style and schedule as in 2020−2021.

The main reasons cited by students who reported being satisfied or somewhat satisfied in the 2022−2023 survey were a preference for face-to-face lectures, the ability to keep up with their studies, concentrate on their learning, and increase their motivation to study. In addition, many students were satisfied with on-demand lectures for review. Among the participants who selected somewhat satisfied or somewhat dissatisfied in the 2022−2023 survey, 14 were worried about the risk of COVID-19 infection from face-to-face lectures. Those who reported being somewhat dissatisfied or dissatisfied preferred on-demand video lectures so they have more time to study. A few students stated that only on-demand video lectures were necessary, and face-to-face lectures were only needed for laboratory practices. Changes in the learning behaviours of the participants were examined in the 2022−2023 survey compared to the previous year. Of the 34 student comments, 15 (44.1%) were about difficulty in finding time for studying due to commuting. In both surveys, some participants also expressed that each student had their preference, so they should be allowed more flexibility to select the lecture style that best suits their needs.

Discussion

This study investigated the changes in pharmacy students' opinions, satisfaction levels, and perceptions of face-to-face and online lectures in the context of the COVID-19 pandemic.

According to the findings, many participants preferred online lectures during the 2021–2022 academic year and were satisfied with their learning experience during the state of emergency. The positive trend in perceptions might be due to the fear of COVID-19 infection since the survey was conducted before vaccination was available to students as of June 2021. Recent meta-analyses of e-learning in health profession education have found positive perceptions of e-learning because of a sense of security during the spread of COVID-19 (Brockfeld, Müller & De Laffolie, 2018). Several studies also suggested that online and face-to-face lectures are equivalent in terms of efficacy and student satisfaction (Porter, Pitterle & Hayney, 2014; Brockfeld, Müller & De Laffolie, 2018; Paul & Jefferson, 2019; Pei & Wu, 2019; Elshami *et al.,* 2021).

Regarding online class methods, participants preferred on-demand video lectures to live lectures. A study conducted at Harvard University also reported that students strongly preferred synchronous recorded live lectures and asynchronous prerecorded lectures with synchronous follow-up sessions over nonrecorded live lectures (Chen, Kaczmarek & Ohyama, 2021). In this study, more than half of the participants had problems listening to live lectures via Zoom because of network and learning environment issues at home. The most reported disadvantages of online classes in the literature are family distractions, internet connection, the timing of tutorials, anxiety, and lack of space (Zureick *et al.,* 2018; Dost *et al.,* 2020). Since distractions during online classes influence learning outcomes (Zureick *et al.,* 2018), students need to have a stable high-speed internet connection and a proper learning environment where they can focus their live classes via Zoom or other online platforms.

Table IV: Comparison of the level of online class satisfaction between the 2021–2022 and the 2022–2023 surveys

	Categorised student feedback	2021–2022	2022–2023	Total
Satisfied	No problem in particular	20	3	23
	Prefer face-to-face lectures (keep up studying, concentrate on my learning, increase motivation, and be able to meet friends)	0	12	12
	Prefer to have on-demand video lectures streaming from the same schedule as syllabus*	8	0	8
	Printed handouts needed in advance	4	0	4
	On-demand video lectures were available for review	0	2	2
Somewhat satisfied	No problem in particular	35	4	39
	On-demand video lectures were available for review	0	14	14
	Prefer to have on-demand video lectures streaming from the same schedule as the syllabus*	13	0	13
	Prefer face-to-face lectures (keep up studying, concentrate on my learning, increase motivation, and be able to meet friends)	0	9	9
	Concern about the risk of COVID-19 infection from the face-to-face lectures	0	8	8
	Chatting/noise during the class	0	5	5
	Printed handouts are needed in advance	5	0	5
	Prefer on-demand video lectures (for more study time, no commuting, etc.)	3	2	5
	Take attendance (including the methods of taking attendance)	1	3	4
	Be able to receive support on time	0	2	2
	Prefer to select either on-demand video lecture or face-to-face lectures depends on the student's preference	1	1	2
	Schedule conflicts (remote class and face-to-face class scheduled same day)	1	1	2
	Printing a lot of color pages consumes ink and is costly	2	0	2
	Prefer to commute to campus only for lab exercises	2	0	2
Somewhat dissatisfied	Prefer on-demand video lectures (for more study time, no commuting, etc.)	1	12	13
	Prefer to have on-demand video lectures streaming from the same schedule as the syllabus*	7	0	7
	Prefer to select either on-demand video lectures or face-to-face lectures or live lectures depends on the student's preference	2	5	7
	Afraid of having COVID-19 infection because of commuting and face-to-face lectures	0	6	6
	No problem in particular	4	0	4
	Chatting/noise during the class	0	4	4
	Prefer to commute to campus only for lab practices	0	3	3
	Printed handouts are needed in advance	2	0	2
	Prefer to have livestreaming lectures to keep up with courses**	2	0	2
Dissatisfied	On-demand video lectures are good enough, and face-to-face lectures are not needed	0	3	3
	Less time to study (commuting)	0	2	2

* Start streaming from the next day of the class due to the management of the KH platform. ** Have to watch multiple video lectures on weekends so it's hard to keep up with courses. Note. Some students provided multiple reasons.

Although most lectures returned to the traditional classroom setting in the 2022−2023 academic year, the level of satisfaction declined compared to the previous year, and only 10% of the participants preferred face-to-face lectures. The negative trend in the perception of face-to-face learning in 2022−2023 may be due to the fact it was mandatory for students to attend. Although some COVID-19 vaccinations were available at the time of the survey in 2022, KU did not mandate students to get vaccinated. Therefore, some got infected by attending face-to-face lectures. Compared to 2021−2022, more participants in 2022−2023 expressed COVID-19 infection-related anxiety, such as getting the infection in class or while commuting. Students may have also not perceived any differences between face-to-face and online classes and believed that online courses alone were sufficient. Despite the higher numbers of quizzes and assignments in online classes, the content and structure were like those in face-to-face lectures. Blended and active learning would be necessary to encourage students to participate in face-to-face classes. It will help students prepare for the knowledge portion on demand while deepening their understanding through discussions in face-to-face lectures.

The results of this study also show that student preference for lecture styles influenced their satisfaction with classes. More participants in the 2022−2023 survey reported being somewhat dissatisfied because they preferred to select a lecture style depending on their needs. Some students could identify the learning strategy that suited them best and expressed their

preference for more flexibility and choices throughout the different lecture styles used in the courses during the pandemic.

Consistent scheduling is essential for high attendance and engagement as students can prearrange their time to participate in the classes (Cong, 2020). Participants who were dissatisfied with face-to-face lectures commented that they preferred the methods of the 2020−2021 academic year, which streamed prerecorded on-demand video lectures on the same schedule as the syllabus. Faculty implemented various approaches to lecture delivery after the beginning of the pandemic; however, the inconsistent patterns of providing lectures depending on the course were not well perceived by students. Choosing a consistent method for obtaining information (i.e., always attending live lectures or always watching on-demand videos) is vital for improving student satisfaction (Zureick *et al.,* 2018).

Interestingly, students' preference for on-demand video lectures increased in the 2022−2023 survey, indicating that this teaching style has benefits beyond reducing the risk of COVID-19 infection. The need for a hybrid teaching model that includes both face-to-face and online lectures aligns with recent research (Hussain *et al.,* 2021). On-demand video lectures are preferred because they improve the quality of teaching and can be repeated as often and for as many times as students necessary. Such a hybrid teaching model will help students with self-directed learning; it will also accommodate those with special needs, illnesses, and excused absences, as it enables them to watch recorded/live lectures at home.

Limitations

This study has several limitations. It was conducted in a single course at a school of pharmacy in Japan and may not reflect the perceptions of students at other institutions worldwide. The response rates were 42.6% and 36.9%, respectively, which may introduce bias into the results as those who chose to participate in the survey may have been more affected by specific factors during the pandemic. Additionally, this study did not collect data on students' previous experiences with online learning. Participants in the 2021−2022 survey had more experience with livestreaming lectures than those in the 2022−2023 survey, which could have influenced their preferences. As the study did not compare the learning outcomes of the different lecture styles, future studies are necessary to evaluate the effectiveness of online lectures.

Conclusion

Overall, this study suggests that students' expectations of online classes during the pandemic were met, and on-demand video lectures gained more popularity as the preferred learning method. Some students identified the learning strategy that suited them best and preferred to have more flexibility and choice of lecture modes. Consistent scheduling and course styles were essential factors for student satisfaction. Pharmacy schools should consider exploring the most effective teaching model that promotes student engagement and improves pharmacy education.

Conflict of interest

The authors declare no conflict of interest. There are no financial conflicts of interest to disclose. This study did not receive any funding.

Acknowledgement

The authors wish to thank the pharmacy students who participated in the survey and Kumi Kasugai, PhD, Takahiro Fukawa, and Eric M. Skier for their comments on the manuscript.

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