

# Rebuilding Face-to-Face Interactive Classes for an Online Format: Practice through an Introductory Class of Behavioral Economics for Pharmacy Students

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## ABSTRACT

The COVID-19 pandemic caused many face-to-face classes to be abruptly converted to online classes. However, there were challenges related to conducting and evaluating online classes. Therefore, this study aimed to rebuild and mold face-to-face interactive classes to suit the online format. Accordingly, we conducted introductory classes on behavioral economics (BE) for pharmacy students, which were previously proposed to be conducted face-to-face. We conducted a 90 minute-class via Zoom. During the class, participants answered quizzes in LoiLoNote School. We presented seven quizzes to 95 of 113 (84.1%) students who accessed LoiLoNote School, and approximately 78 (69.0%) to 85 (75.2%) responded to each quiz. By sharing LoiLoNote School's submission box with the students, we could easily access their responses and conduct a lecture based on the results. In the future, we plan to evaluate the class based on the homework and post-class questionnaire results.

**Key words:** pharmacy education, online learning, behavioral economics

## 1. Introduction

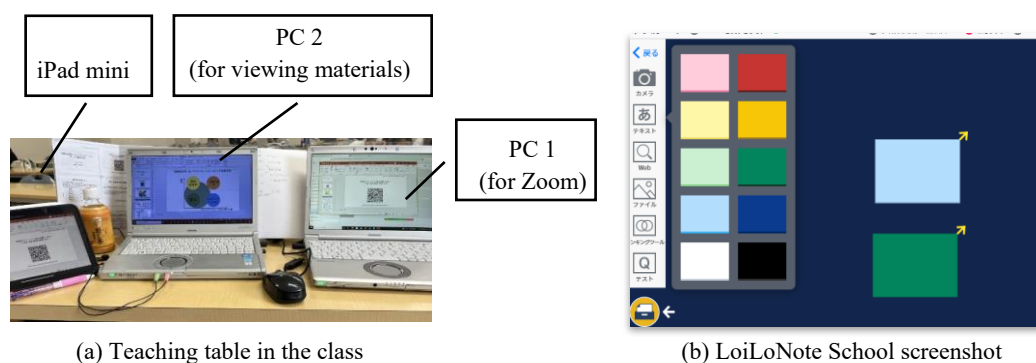
The COVID-19 pandemic severely affected medical and pharmacy education worldwide. Various measures had to be implemented quickly to ensure the safety of students, faculty, and patients while continuing educational activities. One of the measures was the implementation of online classes. Accordingly, Grafton-Clarke et al observed the need to continue reporting on online education and discussing the replicability of the experience of conducting online classes at different institutions and in different fields (Grafton-Clarke et al., 2022).

At Osaka University, Japan, many face-to-face classes were converted to online during the pandemic in 2020. Currently, face-to-face classes have been resumed, but online teaching remains. Osaka University aims to establish a blended education system comprising both face-to-face and media classes, including online classes (OU Master Plan 2027). Therefore, in the future, it will be necessary to combine these different types of classes effectively according to the specific class circumstances (e.g., target students, number of participants, personnel such as teachers and teaching assistants). Therefore, we decided to rebuild and mold face-to-face interactive classes to suit the online format

through behavioral economics (BE) introductory classes for pharmacy students, which we have continued to do since 2019.

In BE, laboratory experiments, psychology, and other social sciences are applied to the economics discipline (Cartwright, 2016). It has recently been applied to studies in the fields of public health (Soofi et al., 2020), medicine (Ohtake et al., 2018), and pharmacy (Krousel-Wood et al., 2022).

If pharmacists understand BE, they can apply the findings to clinical practice. Pharmacists must also recognize biases associated with people's irrational behavior to successfully carry out good interpersonal work as healthcare team members. Therefore, we believe that learning BE has become more important for pharmacy students but is not currently included in pharmaceutical education in Japan (The Pharmaceutical Society of Japan, 2018). Thus, we began introductory BE classes in 2019. Our previous study found that BE was a new concept for pharmacy students, and they were interested in introductory BE classes (Hatabu et al., 2021). Because of the pandemic, our department conducted many classes online in 2020, including our introductory BE classes. This rapid change from face-to-face to online classes reduced students' interactive participation, and we needed to



**Figure 1. Teaching table in the class and LoiLoNote School screenshot. (a) Teaching table in the class. Part of the photo was edited. PC: personal computer. (b) LoiLoNote School screenshot. The students communicated their quiz answers according to the color of the card. They could also present a (short) textual opinion on the card.**

create opportunities for them to understand and react to the contents. In online teaching, including interactive elements like short quizzes is recommended (Gewin, 2020). Our previous study conducted during a face-to-face class found that students had a self-identified need for examples and games that aided intuitive understanding (Hatabu et al., 2021). Therefore, in this study, we aimed to rebuild and conduct an introductory BE class as an interactive online class for pharmacy students.

Initially, we report our 2022 classroom practices. Next, we compare the results with those of our face-to-face classes conducted in 2019 based on some of the questionnaire responses. Finally, using the PICRAT model (Kimmons et al., 2020), we discuss the technology used in this class from a theoretical perspective.

## 2. Materials and Methods

The title of the target class conducted at the School of Pharmacy, Osaka University, was “Special Lecture on Medical Pharmacy.” In this class, we aimed to introduce BE to pharmacy students to increase their interest in the subject. We intended it for students in grades 3–6 of the School of Pharmacy and the master’s and doctoral programs of the Graduate School of Pharmaceutical Sciences. It is an advanced subject in the model core curriculum. We conducted a one-frame (90 minutes) class via Zoom. The class structure was based on the class conducted in 2019; it comprised three topics (pharmacoeconomics, self-medication, and behavioral economics). The main changes from 2019 were as follows: 1) the time for pharmacoeconomics and self-medication was shortened from 25 to 20 minutes each, and the time for BE was lengthened from 25 to 30 minutes, 2) a 5-minute break in the middle of the class, and 3) the results were shared with the students at the beginning of class since the pre-class questionnaire was conducted via Google Forms. At the beginning of the class, participants answered a questionnaire via Google Forms. During the class, they took quizzes in LoiLoNote School (<https://n.loilo.tv/en/>) using colored cards

**Table 1. Tools used in our interactive online class in 2022.**

Tool name	Intended use
Zoom	Online class delivery Sending answers via chat
Collaboration and Learning Environment (CLE)	Distributing materials Having students submit an assignment
Google Forms	Answering questionnaires (before class)
LoiLoNote School	Answering quizzes (middle of the class) Sharing the answers in class

(Figure 1) and submitted the answers in a submission box (Iwai, 2020). In case of difficulties accessing LoiLoNote School, they used the chat function on Zoom to send their answers. The quizzes were not necessary for earning credits. We used the university’s Collaboration and Learning Environment (CLE) to share learning materials and submit reports for credit (Table 1). All Osaka University students have a LoiLoNote School account; however, some have experience using it and others do not. Nonetheless, since many classes in our pharmacy department frequently use the CLE, students are accustomed to it. To conduct the class, we used two personal computers (one for Zoom conferencing and another for viewing materials) and an iPad mini (Figure 1).

To confirm whether the class’s purpose had been achieved, we asked students about their interest in BE using a 4-item method in a post-class questionnaire. The questionnaire’s content was similar to the post-class questionnaire we conducted in 2019 (Hatabu et al., 2021). We also added two questions about LoiLoNote School (user experience and ease of use). We collected the responses online using CLE on the same form as the class report; this method was different from that in 2019.

We used the PICRAT model (Kimmons et al., 2020) to discuss the technology we used in class from a theoretical

perspective. Kimmons proposed this model to classify the relationship between educational scenarios and technology and help teachers practice technology integration. PICRAT classifies students as passive, interactive, creative (PIC) and teachers as replacement, amplification, transformation (RAT). The results are displayed in a  $3 \times 3$  two-dimensional classification.

The Research Ethics Committee of the Graduate School of Pharmaceutical Science, Osaka University (No. yakuhito2022-8) approved this study. Considering the need to protect personal information, we processed some of the screenshots posted to ensure that the participants could not be identified.

### 3. Results and Discussion

In this study, we aimed to rebuild and mold face-to-face interactive classes to suit the online format through BE introductory classes for pharmacy students. The first half of the class mainly comprised lectures and proceeded according to the schedule. However, a slight delay occurred during the quiz, and we omitted some of the contents in the latter half; the class exceeded the scheduled time by five minutes. It took more time to collect the quiz responses online than physically, as we had to switch the Zoom screens. Of the 95 of 113 (84.1%) students who accessed LoiLoNote School, 78 (69.0%) to 85 (75.2%) responded to the quizzes. Some students wrote their answers in the Zoom chat.

We obtained 94 responses to the post-class questionnaire. We also included respondents who answered only part of the questions in the aggregation. In all, 90.3% (total of “agree” and “tend to agree”) of the students who responded to the questionnaire answered that they were interested in BE (Table 2). Although this value was slightly lower than obtained in the face-to-face class conducted in 2019 (92.7%), over 90% of the respondents gave positive answers. Thus, we determined that the change to the online format was reasonably successful.

Sharing the LoiLoNote School submission box with the

students enabled us to observe trends in the students’ responses easily and design lectures accordingly (Figure 2). Some students did not have access to LoiLoNote School. Therefore, we should have prepared class materials in advance so that students could access them before class. However, sharing the LoiLoNote School screen during the class allowed students who could not log in to see their peers’ responses. Additionally, we used the CLE (to which all students are accustomed) for grade evaluation. Thus, we determined that the class’s purpose was mostly achieved. Furthermore, we found it somewhat difficult to switch the shared Zoom screen between PowerPoint and LoiLoNote School while teaching. We occasionally forgot to switch to PowerPoint after sharing the LoiLoNote School screen. To avoid this, having a separate PC dedicated to Zoom might be better for monitoring the students’ views. We intended to use an iPad for that purpose but had to use it to operate LoiLoNote School instead. In the future, we plan to evaluate the class based on the homework and post-class questionnaire results. LoiLoNote School has various functions, but we used only one of them this time—the submission box. We taught three topics and the relationship between these topics in a 90-minute class. Moreover, BE is not common for pharmacy students, and thus, we wanted to enable them to join the class easily.

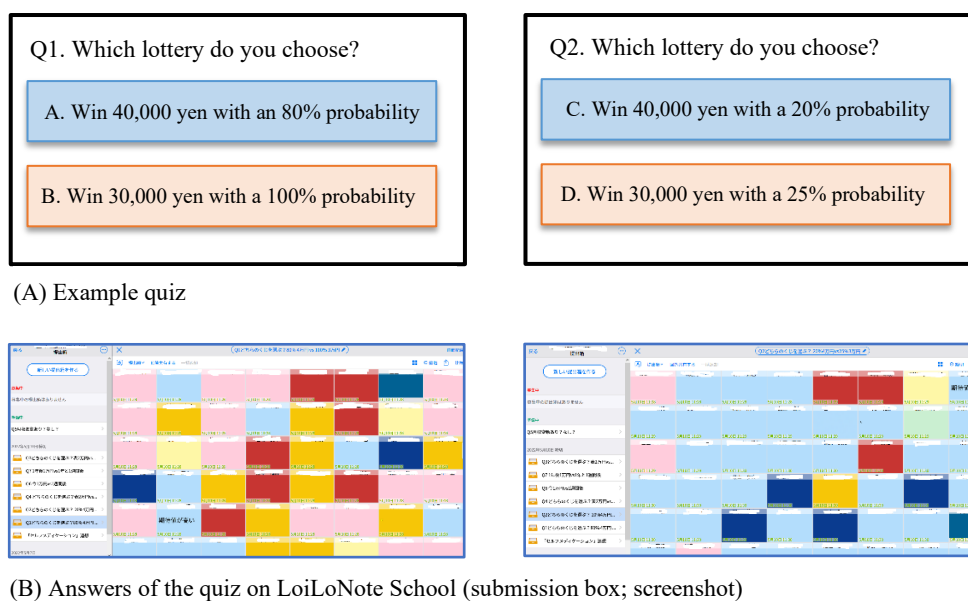
One faculty member (author: AH) conducted this class. Notably, one teacher can conduct this class if they have experience conducting online and active learning-type classes and can spend time on class preparation. However, faculty members are not always in an environment where they have enough time for preparation. Additionally, they must be able to respond to students’ questions and concerns during class. Therefore, if a class like ours is conducted in the future, we recommend having both one staff member and one teacher to support class preparation and help with any troubleshooting.

Our class comprised a wide range of students, including undergraduates (third and fourth-year students: 88 in total)

**Table 2. Class evaluation.**

Category	Questionnaire	n (%)			
		1	2	3	4
Behavioral economics	Were you interested? <sup>†</sup>	42 (45.2)	42 (45.2)	8 (8.6)	1 (1.1)
	Do you think it will be useful for future research or work?	39 (41.5)	46 (48.9)	8 (8.5)	1 (1.1)
	Was the class easy to understand?	55 (58.5)	38 (40.4)	1 (1.1)	0 (0.0)
Pharmacoeconomics	Were you interested? <sup>‡</sup>	34 (37.0)	46 (50.0)	11 (12.0)	1 (1.1)
	Do you think it will be useful for future research or work? <sup>‡</sup>	35 (38.0)	48 (52.2)	8 (8.7)	1 (1.1)
	Was the class easy to understand? <sup>‡</sup>	43 (46.7)	45 (48.9)	4 (4.3)	0 (0.0)

Students answered on the following scale: 1 = I agree, 2 = I tend to agree, 3 = I tend to disagree, 4 = I disagree. Ratios were calculated based on the denominator, <sup>†</sup> n = 93, <sup>‡</sup> n = 92, and others n = 94.



**Figure 2.** Example quiz and answers of the quiz by LoiLoNote School. (A) The sample quiz asked students to explain the certainty effect. Students were required to multiply the probability of Q1 by 0.25 to obtain Q2. Therefore, those who chose A in Q1 should have chosen C in Q2, and those who chose B in Q1 should have chosen D in Q2. However, the reality is different from the theory. B in Q1 tends to be preferred because the probability is 100% (certainty). The source of the quiz is a book (Ohtake et al., 2018). (B) The students communicated their quiz answers according to the color of the card. This screenshot shows LoiLoNote School's submission box and the quiz results in (A). In Q1 (A, left), most students chose B and sent a pink or red card to the submission box (B, left). Contrarily, In Q2 (A, right), most of the students chose C and sent a blue card to the submission box (B, right). Part of the photo was edited (usernames were erased).

and graduates master's and Ph.D. courses: 25 in total. Significantly, the degree of understanding and interest is likely to vary among students. However, in our 2019 survey (including both undergraduate [fourth and fifth-year students: 21 in total] and graduate students [master's and Ph.D. courses: 34 in total]), there was a low percentage of those who knew words and phrases related to BE. Thus, we determined that both undergraduate and graduate pharmacy students had limited knowledge of BE, regardless of their grades. Therefore, in the first half, we explained the basic concepts of BE. This course was part of an elective course on medical pharmacy and meant only for students who were interested in medical pharmacy; therefore, in the second half, we focused on introducing examples of medical applications of BE to even those who are not academically interested in it but could find it useful. In the future, we would like to improve the class content by examining the degree of understanding and interest based on students' responses.

We used the PICRAT model for our teaching practices and discussed future prospects. Our method is classified as interactive, replaces (IR), the most reported category in medical education (Stojan et al., 2022). Most teachers begin with passive replacement (PR)—the bottom left of the PICRAT model. We also started conducting our class only via Zoom due to COVID-19. The top right (i.e., creative, transforms) constitutes better practices in the PICRAT model (Kimmons et al., 2020). LoiLoNote School has many features; if we can use it to amplify or transform face-to-face

classes, we can build creative classes. Additionally, a simple interactive online class, such as ours, which does not require extensive preparation and can be implemented by a small number of teachers, may be useful for sudden changes in class formats.

This report has some limitations. First, the experience was limited to one class conducted in one pharmacy department. Second, the only feedback from participants was the set of quiz responses. Similar classes must be conducted and integrated in the future, and the results of multiple years of classes must be considered. Also, multifaceted verification, such as evaluating what students have learned from assignments submitted in CLE, must be conducted, and the class reports must be analyzed. Therefore, further investigation is needed to determine whether our results are generalizable. However, a practical report could be useful for teachers who want to incorporate information and communication technology into their lessons or improve their methods. We design and improve our daily classes based on various practice reports.

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## References

- Cartwright E. Behavioral Economics. New York: Routledge 2016.
- Gewin V. Five tips for moving teaching online as COVID-19 takes hold. *Nature*. 2020; 580(7802): 295–296.
- Grafton-Clarke C, Uraiby H, Gordon M, Clarke N, Rees E, Park S, et al. Pivot to online learning for adapting or continuing workplace-based clinical learning in medical education following the COVID-19 pandemic: A BEME systematic review: BEME Guide No. 70. *Med Teach*. 2022; 44: 227–243.
- Hatabu A, Uejima E, Takagi T and Ueda M. Integrating behavioral economics in pharmacy education: Surveying students' knowledge and interest. *Med. Ed. (Japan)*. 2021; 52(2): 91–96.
- Iwai H. ZOOM + a. URL: <https://zoom.les.cmc.osaka-u.ac.jp/> (accessed 28 May 2022)
- Kimmons R, Graham CR and West RE. The PICRAT model for technology integration in teacher preparation. *Contemp. Issues Early Child*. 2020; 20(1): 176–198.
- Krousel-Wood M, Peacock E, Bradford WD, Mohundro B, Craig LS, O'Connell S, et al. Time preference for immediate gratification: Associations with low medication adherence and uncontrolled blood pressure. *Am J Hypertens*. 2022; 35(3): 256–263.
- Ohtake F and Hirai K. Iryō genba no Kōdō keizai-gaku Surechigau Isha to Kanja [Behavioral Economics in the Health and Medical field: Misunderstanding between Doctors and Patients]. Tokyo: Tōyō Keizai, Inc 2018.
- Osaka University. OU Master Plan 2027 Detailed Summary (available only in Japanese). URL: <https://www.osaka-u.ac.jp/ja/guide/strategy/files/vsao3x/@/download/file> (accessed 6 November 2022)
- Soofi M, Najafi F and Karami-Matin B. Using insights from behavioral economics to mitigate the spread of COVID-19. *Appl Health Econ Health Policy*. 2020; 18(3): 345–350.
- Stojan J, Haas M, Thammasitboon S, Lander L, Evans S, Pawlik C, et al. Online learning developments in undergraduate medical education in response to the COVID-19 pandemic: A BEME systematic review: BEME Guide No. 69. *Med Teach*. 2022; 44: 109–129.
- The Pharmaceutical Society of Japan, Council for Fostering Human Resources in Pharmacy Education, MEXT, Japan. Model Core Curriculum for Pharmacy Education -2015 version-. 2018. URL: [https://www.pharm.or.jp/kyoiku/pdf/corecurri\\_eng180426.pdf](https://www.pharm.or.jp/kyoiku/pdf/corecurri_eng180426.pdf) (accessed 20 August 2022)