

Practice of Group Learning Using Active-Learning Methods in Online Lessons

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Abstract—In FY 2020, X University started to provide a compulsory subject for first-year students. The university initially designed the subject to be supplied face-to-face using active learning that is applied after dividing the students into small groups. However, the course was reorganized into a non-face-to-face format following the Japanese government's declaration of a state of emergency in response to the spread of the COVID-19 pandemic. In this study, we compare face-to-face classes provided in FY 2019 with non-face-to-face lessons given in FYs 2020 and 2021 using course evaluation questionnaires filled out by students. The results indicate that face-to-face classes are better at promoting three educational goals: small-class education, interaction with people with different views, and group learning activities. The non-face-to-face lessons are preferable for: learning what one should do as a student (student life), understanding the history and characteristics of the university (sense of belonging), learning how to express one's opinion logically, learning how to listen to others respectfully and with interest (attentive listening), learning to avoid being absent or late to class without permission (discipline), gaining an in-depth understanding of the subject matter. Our results suggest the potential for developing non-face-to-face classes comparable to face-to-face ones if we can adequately apply online meeting tools combined with other teaching tools.

Keywords—non-face-to-face lessons, face-to-face lessons, Learning Management Systems (LMSs), online meeting services, electronic whiteboards

I. INTRODUCTION

In response to the rapid spread of COVID-19 starting from around December 19, 2019 pandemic, Japan put the Act on Special Measures against Novel Influenza which came to force on March 13, 2020. On April 7, 2020, the government declared a state of emergency in seven prefectures: Tokyo, Kanagawa, Saitama, Chiba, Osaka, Hyogo, and Fukuoka.

At X University, usually, students begin school during the first and second weeks of April. However, following the declaration of a state of emergency, the University decided to deliver teaching for most subjects in a

non-face-to-face format rather than a face-to-face one. Therefore, the teachers in charge of each subject had to reorganize lessons in a space of only one week.

In this paper, we discuss the course evaluation of a compulsory subject given to the first-year students that had previously been provided in face-to-face format but were reorganized into non-face-to-face lessons. Our discussion is based on an analysis of data from course evaluation questionnaires completed by the students.

II. POSITIONING AND SIGNIFICANCE OF THE STUDY

The department conducting this class was established to deal with the increasing number of students losing motivation to study and self-confidence in their learning ability. The educational goal of this class subject is to help students view themselves as X University students and clarify their ideals and objectives. The ultimate goal of the subject is to improve their self-awareness and worth by interacting with other people and to view themselves fully as students of the respectable X University. The content of this class is prepared by the department's teachers and managed uniquely by the university.

Specifically, the teachers have worked on: (1) creating cross-faculty/department content (about 70 classes), (2) applying cooperative and experiential learning methods in small classes (about 30 students), (3) incorporating 'lessons learned' shared by the teachers of the department and full-time teachers from other faculties, (4) creating lessons that are implemented using a standard syllabus, a standard teaching plan, and teaching materials that are shared to all, (5) making lessons to be supported by Student Assistants (SA) / Teaching Assistants (TA), and (6) making lessons be provided by various (cross-faculty/department) members. To achieve these goals, especially in creating a standard syllabus, a standard teaching plan, and teaching materials, the department's teachers take the leading role.

The department has adopted Kolb's learning styles of experiential learning and independent learning [1–3]. In experiential learning, students participate in a lesson activity (experience something) and then describe the content of the lesson by looking back and conceptualizing the details. The learned lessons are also utilized in the future (in the following class). The aim is to make these

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steps a regular part of their daily study regime (independent learning or in-class learning?) (Fig. 1) [4].

To master this subjective learning method, students must repeatedly pass through the process of active learning that is based on cooperative learning. In the small groups created for cooperative education, they learn to express their opinions, listen to others, draw conclusions, and finally rethink the topic (reexamine their initial understanding) (Table I).

The lessons are carried out in three phases. In phase 1, students meet various people and learn how to interact with them. In phase 2, they work in groups and start learning. In phase 3, they compile their four-year study plan at the university while considering their future after graduating (Table I).

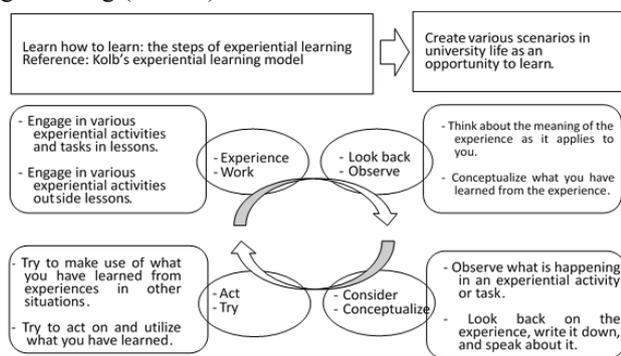


Figure 1. Steps of experiential learning in the subjects.

TABLE I. STRUCTURE OF THE LESSONS

No.	Class description
1	Orientation
2	Meeting other people in a new environment
3	Thinking about what it means to study at a university
4	Listening to and understanding other people (1)
5	Listening to and understanding other people (2)
6	Thinking about rules and manners
7	Getting to know about X University
8	Describing X University to other people
9	Getting to know about the library
10	Interviews with academic staff
11	Appreciating the importance of yourself and other people
12	Learning from graduates
13	Thinking about your profession and yourself
14	Projecting your future university life
15	A message to yourself in the future

III. RESPONDING WITH NON-FACE-TO-FACE CLASSES TO COPE WITH THE SPREAD OF COVID-19 PANDEMIC

In FY 2020, universities stopped providing face-to-face lessons due to the government's declaration of a state of emergency that prohibited students from attending school. It was a major challenge for the university to reorganize and provide the lessons non-face-to-face, which were originally designed to be delivered face-to-face, within a short preparation period of just one week; Especially since an active-learning method, which is applied in a classroom that is divided into small groups, had been in use. The

university finally started providing the lessons two weeks late than the originally scheduled date after introducing several changes (Table II). In FY 2021, all lessons were provided via an online meeting software (Zoom [5]) [6–8], combined with a Learning Management System (LMS [9]) (Table III).

TABLE II. CHANGES IN LESSON CONTENT (FY 2020 SYLLABUS)

Lesson content	Implementation Method
Orientation (1) Orientation (2) Meeting other people in a new environment and thinking about what it means to study at university Getting to know about X University Listening to and understanding other people Thinking about rules and manners (1) Appreciating the importance of yourself and other people	On-demand [10] lessons using LMS
Thinking about rules and manners (2) Describing X University to other people Learning from graduates Being aware of your own characteristics Projecting your future university life A message to yourself in the future	

TABLE III. CLASS CONTENT (SYLLABUS) IN FY 2021

Class description	Implementation Method
1. Orientation 2. Getting to know each other by introducing yourself 3. Meeting other people in a new environment 4. Making friends 5. Thinking about studying at university 6. Listening to and understanding other people 7. Thinking about rules and manners 8. Appreciating the importance of yourself and other people 9. Getting to know about X University 10. The diverse range of people at X University 11. Learning from graduates 12. Being aware of your own characteristics 13. Projecting your future university life 14. Deepening interactions with other people 15. Messages to yourself in the future	Zoom and LMS

We changed the order of the provision of classes, and up to the seventh lesson provided using only the LMS. From the eighth lesson and thereafter, we created a lesson plan that also used the online meeting service Zoom in addition to the LMS. The plan was offered to teachers in charge of the subject, but it was left to the teachers to decide whether to use the service or not.

In lessons using the LMS, students could access the assignments published on the LMS when the initially scheduled face-to-face lesson hour started. They were to work on assignments during the class hour. (They could prepare for the subject by reading the corresponding pages of printed workbooks distributed in advance.)

The classes were designed to encourage active interaction (discussion) between the students and teachers using the contents of the assignments as discussion points by applying various strategies. For example, in some lessons, the students watched videos or reviewed their assignments using the LMS's shared browsing function. Or by using the bulletin board, when a student posted a question, other teachers or students expressed their opinions. Following each lesson, the students were required to post a review on the LMS, after which the teacher in charge of the lesson gave individual feedback. The students were considered to have attended a lesson only after having posted a review on the LMS.

IV. COURSE EVALUATION

A. A Findings from Course Evaluation Questionnaires Completed by Students

We compared the face-to-face classes provided in FY 2019 to the non-face-to-face classes provided in FY 2020 using the course evaluation questionnaires completed by students through the LMS at the end of the last (15th) lesson (usually in July). The questions (Table IV) had four possible answers: 1. I strongly agree; 2. I agree; 3. I tend to disagree; and 4. I strongly disagree.

To assess whether the differences in the mean values of the results are statistically significant, we carried out a two-sided t-test at a level of significance of 1% for each item (Question). However, we used Welch's method for several questions (Question Items 1, 2, 3, 5, and 7) for which equal variance could not be confirmed between populations using Levene's test for homoscedasticity. The results show that all differences among the mean values are statistically significant (Table V).

TABLE IV. QUESTION ITEMS IN THE COURSE EVALUATION QUESTIONNAIRES FOR STUDENTS

No.	Contents of question
Q1	What you should do as a student (Student life)
Q2	Knowing the history and characteristics of the university (Sense of belonging)
Q3	Logically expressing one's opinions (Expressing one's opinions)
Q4	Listening to other people with respect and interest (Listening closely)
Q5	Avoiding being absent from or late to lessons without permission (Discipline)
Q6	Small-class education is useful (Small-class education)
Q7	Interaction with students of other faculties/departments (Interacting with other people who have different ideas)
Q8	Group learning activities were helpful (Group learning)
Q9	Understanding the subject in depth by submitting assignments and receiving comments from teachers (In-depth understanding)

Next, we compared the evaluations of the non-face-to-face lessons provided in FYs 2020 and 2021. The questions had four possible answers: 1. I strongly agree; 2. I agree; 3. I tend to disagree; and 4. I strongly disagree (Table VI). In addition, we conducted a two-sided t-test on the students' data at a significance level of 5% for each Question. However, there was no significant difference among the population that could affect any question item (Table VI).

TABLE V. COMPARISON OF COURSE EVALUATIONS BETWEEN THE FACE-TO-FACE LESSONS IN FY 2019 AND THE NON-FACE-TO-FACE LESSONS IN FY 2020

Q	Non-face-to-face lessons (2020)		Face-to-face lessons (2019)		T	Df	P
	N	\bar{x}	N	\bar{x}			
1 [#]	1,996	1.80	1,960	2.00	10.03	3,848	0.00**
2 [#]	2,001	2.67	1,957	3.00	15.05	3,889	0.00**
3 [#]	2,001	2.44	1,960	2.54	4.57	3,910	0.00**
4	2,001	1.59	1,961	1.74	8.08	3,960	0.00**
5 [#]	1,995	1.51	1,932	1.57	3.17	3,898	0.00**
6	1,505	1.70	1,691	1.58	5.00	3,184	0.00**
7 [#]	1,505	1.67	1,691	1.47	8.08	3,194	0.00**
8	1,505	1.80	1,693	1.51	11.93	3,196	0.00**
9	1,504	1.72	1,684	1.87	6.03	3,194	0.00**

$p < 0.01$

[#] Items in which equal variance cannot be confirmed between populations in FYs 2019 and 2020.

TABLE VI. COMPARISON OF COURSE EVALUATIONS BETWEEN THE NON-FACE-TO-FACE LESSONS IN FYs 2020 AND 2021

Q	Non-face-to-face (2021)		Non-face-to-face (2020)		t	Df	P
	N	\bar{x}	N	\bar{x}			
1	1,307	1.66	1,996	1.80	0.79	1,238	0.43
2	1,307	2.14	2,001	2.67	0.73	933	0.47
3	1,307	2.07	2,001	2.44	0.74	861	0.46
4	1,307	1.50	2,001	1.59	0.18	1,126	0.86
5	1,307	1.69	1,995	1.51	0.80	1,193	0.43
6	1,307	1.42	1,505	1.70	0.12	1,165	0.91
7	1,307	1.34	1,505	1.67	0.04	1,143	0.97
8	1,307	1.41	1,505	1.80	0.46	1,123	0.65
9	1,307	1.73	1,504	1.72	1.49	1,189	0.14

$p < 0.05$

The statistical analysis of the comparison of FY 2020 (face-to-face classes) to FY 2021 (non-face-to-face classes) shows that face-to-face lessons are preferable for promoting:

- Small-class education.
- Interaction with students from other faculties/departments (with others who might have different ideas).
- Group learning activities (group learning).

On the other hand, non-face-to-face lessons are preferable for:

- Learning what one should do as a student (student life).
- Understanding the history and characteristics of the university (sense of belonging).
- Learning how to express one’s opinion logically.
- Learning how to listen to others respectfully and with interest (attentive listening).
- Learning to avoid being absent or late to class without permission (discipline).
- Gaining an in-depth understanding of the subject matter as a consequence of working on assignments, submitting and then receiving comments from teachers (in-depth understanding) (Fig. 2).

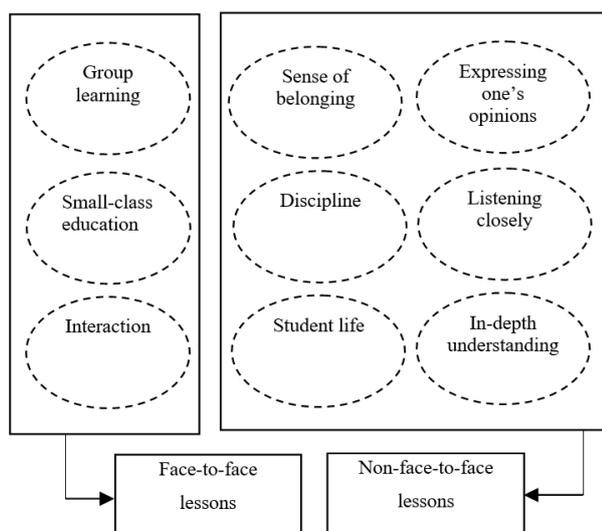


Figure 2. Responding to lesson style (face-to-face and non-face-to-face) by the course objective group using the course evaluation as an index.

Comparison of course evaluations of the face-to-face lessons in FY 2019 to the non-face-to-face lessons in FY 2020 showed a significant difference in the average values observed for all the questions. The averages of evaluations for the non-face-to-face lessons given during the FYs 2020 or 2021 are similar. This shows that benefits found from non-face-to-face classes were not a one-time incident but were achieved because of providing classes in that manner.

B. Suggestions from the Free Answer Questions

Here are some examples of the students’ views, expressed in their own words, for Question Items 6 (small-class education), 7 (interaction), and 8 (Group learning): “If the classes had been in face-to-face format, they would have been more interesting, and I would have been able to interact with students from other departments”; “It was unavoidable to have non-face-to-face class during this difficult situation. However, if I had communicated directly with other students, I could have improved my understanding of the study”; “I would have been able to get to know and get on well with my classmates had the classes been face-to-face. I did not feel that I had sufficient communication with them in online meetings”; “If the course had been provided in face-to-face form, we could have expressed and exchanged our opinions more easily with teachers and

classmates”; “I was disappointed not to have direct communication with other students and teachers, not only during lessons, but also on other occasions”; and “I wanted to interact with many students. It’s really unfortunate that the course ended without actually meeting my classmates”.

Of the 978 responses (2,102 in total), 209 (21.4%) expressed positive opinions to the face-to-face classes, out of this 115 (11.8%) did so because face-to-face lessons promoted interactions between students.

Here are what some of the students wrote in regard to the questions 1 (student life), 2 (sense of belonging), 3 (expressing one’s opinions), 4 (listening attentively), 5 (discipline), and 9 (in-depth understanding): “I wanted to have more Zoom lessons”; “I wanted to use Zoom earlier on during the course”; “I would have preferred a greater number of Zoom lessons to allow interaction with other students, since we could not attend any face-to-face lessons”; “I think we would have been able to communicate with students from other faculties more had we started to use Zoom earlier”; “I wanted to communicate more with teachers and students of my batch using Zoom”; and “Although we had no choice about lessons being provided online, I wanted to have more communication with other people by using Zoom and a message board”. In total, 234 responses (23.9%) were positive about the use of Zoom.

C. Responses from Teachers in Charge

Because X University had to start providing non-face-to-face classes suddenly, it started using the online meeting platform Zoom only in the middle of June, starting from the eighth lesson and onwards. On starting Zoom lessons, we carried out a survey on the use of Zoom by preparing questionnaires to be completed by teachers in charge (41 responses) (Table VII).

TABLE VII. USE OF ZOOM IN CURRENT LESSONS (N: 41)

	Yes	No	N.A.
1. I use Zoom.	65.9 (%)	31.7 (%)	2.4 (%)
2. I engage in interactive exchange using Zoom.	63.4	34.1	2.4
3. I have used the Breakout Rooms feature.	29.3	68.3	2.4

The results showed that over 60% of teachers used Zoom to provide lessons and interact with students; however, fewer than 30% used the Breakout Rooms feature. Moreover, as many as 75.7% of teachers have a positive attitude towards using Zoom in the future when we include those who answered, “I use it as part of a rough lesson plan” and “I would like to use it if I could” (Table VIII).

TABLE VIII. USE OF ZOOM IN FUTURE LESSONS (N: 41)

Answers to questions about using Zoom	%
1. I want to use it (I will figure out how to use it by myself).	—
2. I want to use it (I use it as part of a rough lesson plan).	22.0(%)
3. I’d like to use it if I can.	53.7
4. It is difficult to use.	9.8
5. Others	12.2
N/A	2.5

V. CONCLUSION

Table IV shows the conditions, we believe, that need to be met in order to achieve the compulsory course's final goals. Of these, according to students, non-face-to-face lessons were better in promoting: learning what one should do as a student (student life), understanding the history and characteristics of the university (sense of belonging), learning how to express one's opinion logically, learning how to listen to others respectfully and with interest (attentive listening), learning to avoid being absent or late to class without permission (discipline), gaining an in-depth understanding of the subject matter as a consequence of working on assignments, submitting and then receiving comments from teachers (in-depth understanding). However, face-to-face classes were better at promoting: small-class education, interaction with students from other faculties/departments (with others who might have different views), and group learning activities (group learning).

Despite our efforts, with non-face-to-face classes, we were unable to offer a study environment that could realize the final goal of the subject, "interaction with other people", at an equal level to face-to-face classes. However, the results from the course evaluation questionnaires that the students completed suggest considerable potential for providing group-learning activities that enable teachers and students to interact flexibly and exchange opinions easily, similar to face-to-face lessons; for example, by preparing a quasi-face-to-face study environment while using non-face-to-face lessons over online meeting platforms like Zoom early on from the beginning of the fiscal year in April. In addition, we can adequately utilize the Breakout Rooms feature, which enables us to create and interact in small groups.

In summary, all these observations suggest the potential to develop non-face-to-face classes with quality comparable to face-to-face classes, provided that we can effectively use online meeting tools with a range of teaching materials such as printed textbooks, an LMS, and digital whiteboards.

When designing Zoom lessons, there was a concern that students' satisfaction with lessons would be markedly lower than with face-to-face lessons. However, the results showed that this was not the case. Instead, their satisfaction levels tended to be higher when using Zoom. It seems that online lessons were not a significant challenge for students of this generation who are "digital natives". Although we used online classes as a temporary and emergency measure to respond to the current social conditions, the results show that it might be possible to use this method even under conditions in which face-to-face

classes are feasible. However, some teachers who are uneasy about conducting online classes may need help in using the non-face-to-face lesson environment. For example, they may provide only one-sided lessons (not engaging students) by not utilizing features like Breakout Rooms in Zoom or may not use online whiteboards effectively.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

Ryo Sugawara conducted the research and wrote the paper; Shun Okuhara analyzed the data; all authors had approved the final version.

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