

Implementing Pair Work for Using Smartphones in University Liberal Arts Education

Yoshihiko Oya, Nagoya University of Foreign Studies, Japan
Kimiko Uchida, Nagoya University of Arts and Sciences, Japan

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Abstract

There has been a marked decline in students' motivation in liberal arts courses at Japanese universities. Consequently, as a countermeasure, research and practical classes focused on active learning are being conducted. However, a majority of the practical teaching techniques imitate active learning methods used in the U.S., a country with advanced active learning whose citizens have high communication skills; moreover, there are several problems in adapting these techniques directly to universities in Japan, which are insular and whose students are characterized by low communication skills. The authors introduced pair work to basic information education classes in universities and have determined that even for the passive Japanese, pair learning increases motivation and improve communication skills and the ability to think; further, it has a high learning effect. In view of these results and existing problems in liberal arts education, the authors considered that using pair work in classes would enhance educational effects in liberal arts courses. Further, as the rate of smartphone ownership in our university has reached approximately 100%, it was predicted that students would actively participate in classes by using smartphones. Therefore, the authors attempted to conduct practical classes with pair work using smartphones in liberal arts education classes. As a result of that, even though there were variations due to different combinations of pairs and the individual characteristics of the students, it was revealed that students participated more actively than in usual classes, and the motivation to learn and levels of satisfaction increased.

Keywords: pair work, smartphone, liberal arts education

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Introduction

In the classes of liberal arts courses at Japanese universities, the decline in student motivation for liberal arts education is remarkable. The reasons for this decline are as follows: 1) student's basic academic ability and intellectual curiosity are declining, 2) education concerning qualifications and specializations is regarded as important, liberal arts subjects are considered insignificant, 3) most liberal arts classes are conducted with many students and one teacher; therefore, the teaching method must be the one-way lecture kind.

To improve student engagement, research and experimental classes focused on active learning, as recommended by the Ministry of Education, Culture, Sports, Science and Technology, are being conducted as a countermeasure. Example approaches include the works of Yamauchi (2017) as well as Brent and Roger (2017). However, a majority of the practical teaching techniques imitate active learning methods used in the U.S., a country with advanced active learning whose citizens have high communication skills; moreover, there are several problems in adapting these techniques directly to universities in Japan, which are insular and whose students are characterized by low communication skills.

Since 2003, we have introduced pair work to the basic information education of the university, and have studied the effects of pair work (Oya & Uchida, 2013; Uchida, Oya, & Okuda, 2013) and the factors that inhibit the use of pair work in class rooms (Uchida & Oya, 2011) and the effective pair formation method used in class rooms (Uchida, Oya, & Okuda, 2015). As a result, it was confirmed that pair learning arouses motivation for learning, that communication ability and thinking ability are improved, the learning effect is high, and that it is possible to perform more effective pair work by eliminating impeding factors of pair work.

In view of these research results and the problems of liberal arts education, classes using pair work can not only enhance educational effect in liberal arts courses but also help to foster communication skills, such as logical thinking ability, and improved decision making skills.

One of the biggest differences between basic information education and liberal arts education is the presence or absence of a personal computer (PC). Pair work research in basic information education has been done by pair sharing of intermediate monitors in a PC classroom. However, in most courses of liberal arts classes, we do not use PC classrooms, and the classes are conducted primarily in a classroom with a blackboard or simple AV equipment.

To address the lack of PCs in liberal arts classes, we considered substituting with smartphones. Fuxin (2012) indicated that, as the functions of mobile phones and smart phones improve, they are becoming a preferred technology for replacing PCs. Fuxin (2012) further introduces many reports on smartphones use in higher education. As a preliminary survey, a questionnaire was given to about 200 people who have taken the liberal arts classes at university and the ownership rate of smartphones was almost 100%, with 98% reporting ordinary use. Also, at our university, we have promoted the e-Learning platform called Moodle (interactive learning support software), and 87% of students reported having used Moodle and nearly half used it

routinely. Wireless internet is available in all classrooms at our university and therefore pair work using smartphones is possible without any problem under the current ICT environment. Here, we will introduce practical lessons for pair work through the use of smartphones in a liberal arts course, and examine the results, effectiveness, and problems, and further would like to look at smartphone usage for lesson.

Method

We developed a practical lesson of pair work using smartphone for an academic education lesson (environmental science) for 41 students (refer to Figure 1).

In the first lesson, we conducted a questionnaire to assess students' initial understanding of fundamental environmental problems and degree of interest, for comparison with an evaluation after class.

We then conducted eight regular classes on environmental issues. These regular classes involved distributing handouts and lecturing to students in one direction while doing slides and board work. Before the class with pair work, we conducted a simple questionnaire survey on Moodle using smartphone. The purpose behind distributing this questionnaire was to test for the ease of smartphone interfacing during the practical lesson class.

The practical lesson was conducted tenth from the beginning of the class which seems to have acquired basic knowledge on the environment to some extent. In the regular classes, students are free to choose seats, but in the experiment classes, we created pairs in advance with random numbers and assigned seats accordingly. The lesson's content dealt with an energy problem. After distributing notepads to students, they viewed slides and conducted regular classes for 30 minutes while writing on boards as needed.

Because there are many students who arranged the IC recorder to record the contents of the conversation and then talk for the first time, we set a free conversation time of 5 minutes. After the free conversation, the students (in pairs) answered 20 multiple-choice questions on Moodle using smartphones. The time allotted to complete the questionnaire was 20 minutes. Then, the students answered a post questionnaire by using a mark sheet.

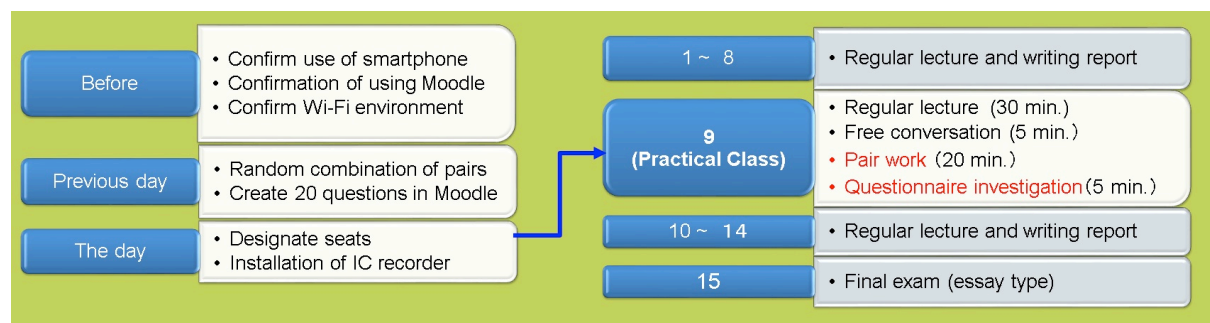


Figure 1: Flow chart of the study method.

Results

Outline of Results

The class with pair work consisted of 20 pairs with one group being a group of three to account for the odd number of students. There were no issues with the smartphones connecting to the network or with Moodle access and operation.

The results of the tests averaged 15.9 on a scale of 20, nearly 80% of the students answered the questions correctly (refer to Table 1). For questions concerning important keywords used in the lecture, they scored almost 100% correct. It appears that the lecture time, as short as 30 minutes, followed by a pair examination immediately afterwards concentrated on the lesson, resulted in high scores. However, the percentage of correct answers was less than 50% for questions with unknown terms in the question options or application-based questions that were asked based on the knowledge gained in the lesson.

Table 1: Outline of results.

	n	Average	Min.	Max.	S.D.
Score	41	15.90	12	19	2.01
Time (sec.)	41	570.34	260	1083	208.93
Number of Utterance	41	53.54	24	93	18.52
Number of Utterance by time (min.)	41	5.81	3.58	9.70	1.47

The time required for pair work was 20 minutes (1200 seconds), but the time it took to access the course problems on Moodle and send the final answer was about 9 minutes 30 seconds (570 seconds) on an average. The first students completed in about 4 minutes. It is necessary to add time for launching a web application from a smartphone by accessing Moodle, and logging in; however, it seems that about 15 minutes was appropriate for this portion. The student who answered in the shortest time used only 13 seconds per question, but there were more than 30 recorded utterances, suggesting that pair work was conducted. In future studies, it is necessary to analyze the content of each utterance, and it is important to make improvements such as adding essay questions and questions requiring internet research to the multiple-choice questions.

Compared with regular class

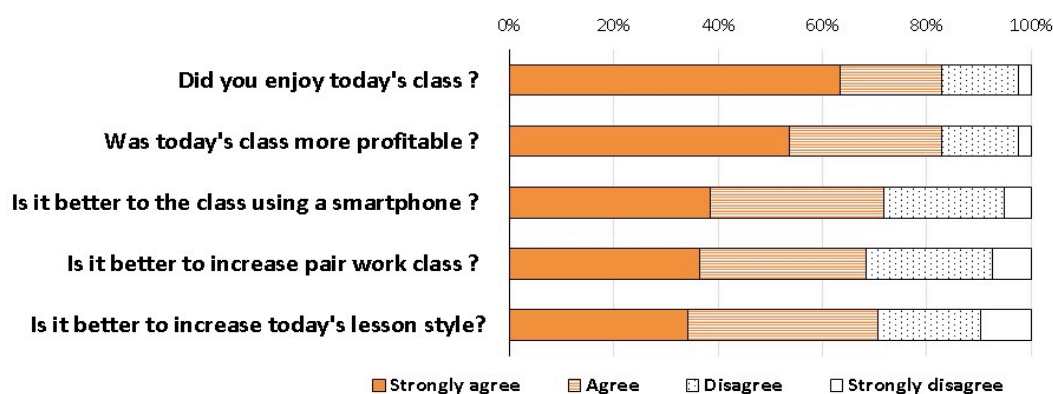


Figure 2: Questionnaire results on the practical class.

The total number of utterances was 53.5 on an average and 5.8 times per minute. This is within the expected range when compared to that of the number of utterances (pair Test 1—9.02 times/minute, pair Test 2—4.90 times/minute) during that pair work that was conducted by the authors (2014) with information literacy. However, the pair Test 1 is a problem given a problem and it changes the sentence of Word given based on it, and although it is close to the case where the problem sentence or choice is given in advance this time, the pair As for the reason why the number of utterances per unit is small compared to Test 1, we must wait for future conversation analysis.

About the Method

According to the post-questionnaire about the class with pair work, 80% of students agreed or strongly agreed that the class was more enjoyable (refer to Figure 2). However, nearly 30% of students had negative responses to increasing pair work in class. This is considered to be an indication of anxiety that you cannot take it easy to reduce classes at a time because it is accustomed to an easy lesson of simultaneous lesson although it is admitted that this method is enjoyable and effect of learning is high. Especially in the case of liberal arts subjects, motivation towards class tends to be low, so it seems that such opinions were seen although it is a small number.

About Pair Work

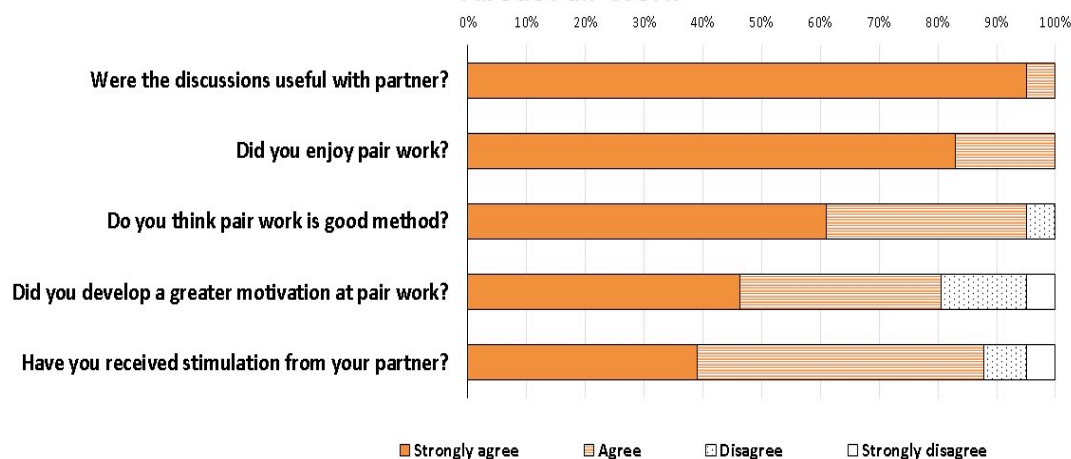


Figure 3: Questionnaire results on pair work.

About Pair Work

The student's evaluation of pair work is as shown in Figure 3. Everyone who completed the practical lesson enjoyed it and reported having useful discussions with their partner. In addition, the majority of opinions were positive regarding the ease of answering, the method of pair work, the deepening of understanding, and the growing motivation for learning. Furthermore, 95 percent of the students were inspired by their partner. From these facts, it is clear that pair work is extremely effective for students.

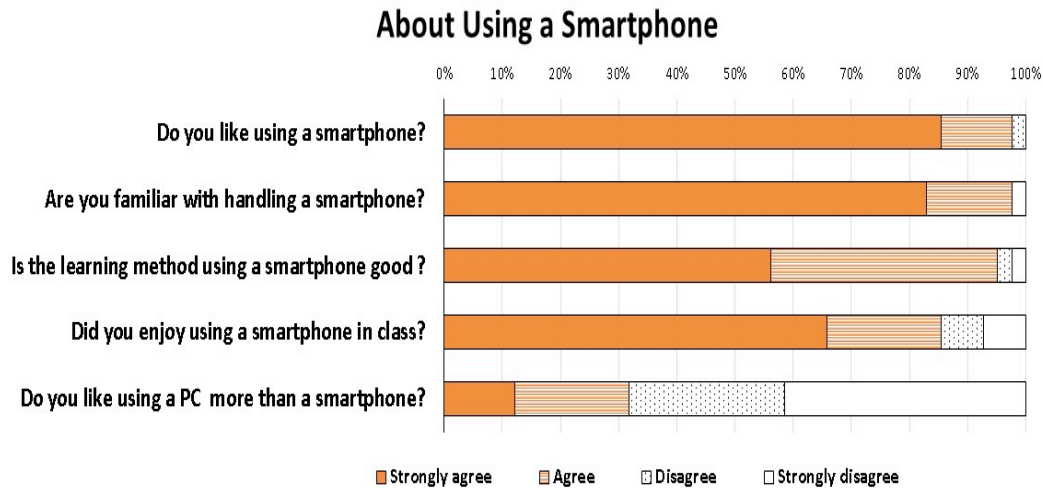


Figure 4: Questionnaire results on using smartphone.

About Using Smartphone

In general, the students had a positive response to using their smartphones. According to the questionnaire results, most students enjoy using smartphones, and there appears to be no concern about classes utilizing smartphones. More than 95% of students answered that the pair work was a good way to use smartphones in classes. In comparison to PC, only about 10% of students want to use a PC, and about 70% of the students say that smartphones are more useful than a PC. It appears that the use of smartphones in classes will be supported by students.

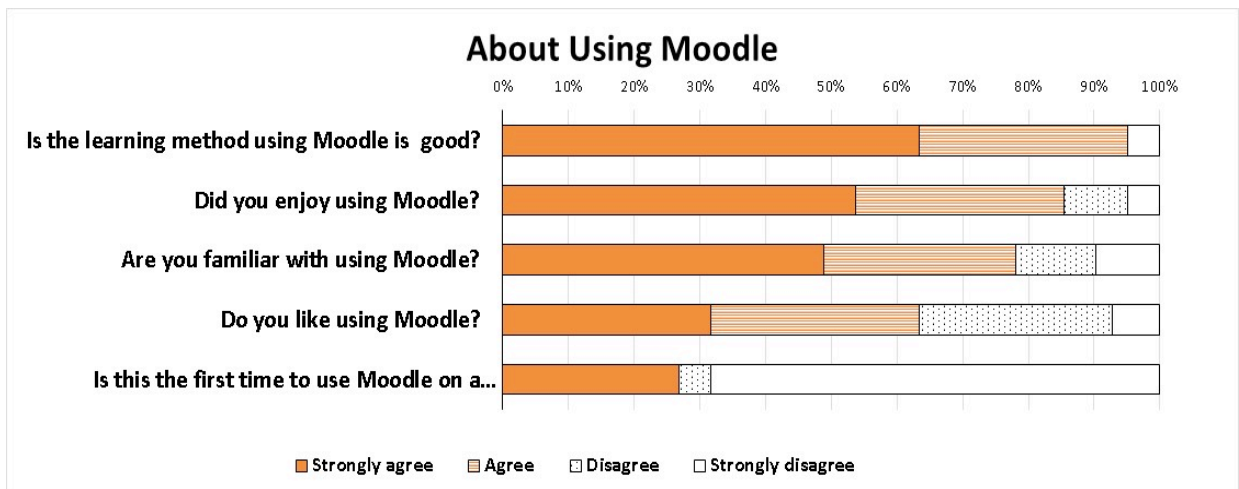


Figure 5: Questionnaire results for using Moodle.

About Moodle

Moodle and smartphone use was popular among students, and 97% of the responses were positive. Over 80% of students responded positively to using Moodle. Also, over 70% of students have used Moodle on smartphones. However, unlike smartphones, about a third of students remember feeling resistance to using Moodle. Therefore, it appears there is a need to make Moodle appealing in the future.

Discussion

Based on the above results, it appears that the practical lesson was able to be conducted almost as intended. Looking at the free response column of the post-questionnaire, similar to that of the results of the questionnaire of the selective questions, there were many positive descriptions for this lesson as that of the following examples: "I enjoyed having a new form of class that I have never had," "I think that it was good to talk with people who do not usually speak," "It was good that I was motivated to cooperate with nature and challenge the problem because it was a pair work."

However, some students say, "Though it is good for contents with definite content, thought that question with no answer of type that deepens ideas by deep discussion is good," many of the conversations are devoted to checking the answer and it is inevitable that the deep learning was not done. In the future, it is necessary to incorporate problem forms for which the answer can only be obtained after investigation and discussion in pairs.

Although there was no opposition to pair work, there were a few criticisms about smartphone usage such as "As moodle was a bit hard to read on a smartphone, it is better to use question paper if possible," or "I wanted to write on paper rather than using a smartphone." Therefore, we must further investigate whether to use smartphone or to use question papers.

Conclusions and Future Study

As a result of practicing pair work using smart phones in liberal arts classes, the following conclusions can be made.

- 1) There were no issues with the use of smartphones, access to Moodle, operation, or operation of Moodle. The class was able to proceed smoothly almost as planned, with a generally favorable response from students.
- 2) The time required for pair work was about 9 minutes and 30 seconds on an average. The fastest students finished in about 4 minutes, and most of the pair discussion was confirmation of answers. In the future, we will add questions requiring more discussion to the multiple-choice questions.
- 3) Although there were no objections to pair work from the free response of post questionnaires, there were some critical responses about smartphone classroom usage, so it is necessary to further examine the use of smartphones. In the future, we will reexamine the problems of 2) and 3), proposing a more effective learning method, and plan to apply it to approximately 100 adult classes.

Acknowledgement

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