

Implementation of Active Learning Strategies in a Large-Enrollment Economics Class at a University

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Abstract—Although active learning (AL) strategies have been introduced in multiple contexts, application of the strategies in large-enrollment class still leaves much room for improvement. The purpose of this study was to describe how to apply AL strategies in a large economics class at a university. A total of 297 students on economics course at Kagawa University in fiscal year 2017 were enrolled. Designation of the course consisted of multi-step instructive techniques such as instructor-oriented seating system, multiple times of group discussions, immediate feedback from the instructor, and selection of excellent worksheets and reaction papers. At a practice level, well-designed questions at different levels, and appropriate choice of these questions for group discussions could facilitate instructor-students interactions even in the large class. Students appeared anxious about AL style class at the beginning of the course, but they gradually got used to the style, possibly due to multiple times of group discussions and immediate and meaningful feedbacks from the instructor in class. Text analysis of reaction papers from students revealed that students were impressed by both AL style lessons and the course contents. This study highlights the importance of instructors' active teaching for AL of students in a large-enrollment class.

Keywords—active learning strategy, large-enrollment class, reaction paper, text analysis

I. INTRODUCTION

“How to make student learn more actively?” is still one of concerns for teachers at all levels. In Japan, the term “active learning” (hereafter AL) has appeared in literatures of higher education since 2000 [1]. In 2012, the Central Council for Education's report suggested that “switch from one-way lecturing to active learning which a student is independent and discovers a problem in a class, and finds a solution is necessary” [2]. Since that, many practical studies have been reported not only in elementary and secondary education but also in higher education, however, the root and common definition of AL have not clearly been identified so far [3]. In addition, the term AL is frequently used in Japanese literatures as teacher's lesson style as well as student's performance, leading to misunderstanding and confusion among related population. To avoid this confusion, the authors adopted the following definition of AL stated by Mizokami [4].

“Active learning includes all kinds of learning beyond the mere one-way transmission of knowledge in lecture-style classes (= passive learning). It requires engagement in

activities (writing, discussion and presentation) and externalizing cognitive processes in the activities.”

Based on Mizokami's definition of AL, Mitachi [5] suggested that the term should be redefined by teachers' lesson styles and students' behaviors observed in class. TABLE 1 shows that the term “active learning strategies” means instruction modes (teachers' behaviors), and that the term “active learning” means students' behaviors.

Despite many previous studies on practices in small class with AL strategies, the strategies have not been well applied in large-enrollment class (over hundred students, hereafter large class) so far, with a small number of reports showing positive aspects in AL style large class [6].

A comparative study of light and strong AL strategies in two large economics classes by Matsumoto and Akiyama [7] showed no difference in official course evaluation. But, the class with the latter strategy, in which students had multiple times of group discussion, scored higher (not statistically significant) in final course grades than the class with the former strategy, in which students had some chances to state their opinions, implying possible superiority of strong AL strategy. As for practical studies of AL style small classes on economics, Shiigi [8] showed the way he, as an instructor, tried to apply AL strategies to his class, without data of students' performance. Yoshida [9] described his detailed design of AL style economics seminar.

Text analysis is known to be a powerful tool to analyze sizable text data. Text analysis by Sugita [6] of free comments from students about AL strategies in a large class found that students had some psychological pressures at the start of the term when introduced to be engaged in group for discussion.

TABLE I. REARRANGEMENT OF MIZOKAMI'S DEFINITION OF ACTIVE LEARNING BY TEACHERS' INSTRUCTION MODES AND STUDENTS'S BEHAVIORS [5]

	<i>Instruction modes (Instructors' behaviors)</i>	<i>Students' behaviors</i>
Passive learning	One-way lecturing (teaching by telling approach)	Listening only
Active learning (all beyond passive learning)	Active learning strategies (or techniques)	Activities including writing, talking, presenting, and expressing recognition processes through these activities

Here in this study, the authors aimed to describe how to apply AL strategies in a large economics class at a university. With the detailed description of the design and practice of AL style large class, they emphasized the difference between instructors' behaviors and students' performance. Additionally, they described how the attending students reacted in the class by analyzing their reaction papers.

II. DESIGN OF AL STYLE CLASS

A. Participants and Target Course

A total of 297 students who attended economics course at Kagawa University in fiscal year (FY) 2017 were enrolled. T.O. conducted all lessons in the course. The course had been provided in a one-way lecturing style until FY 2015. After preparation period in FY 2016, the strategies were fully introduced. The course had 14 lessons, 90 minutes each, once per week, and details of AL strategies were introduced at the first lesson. The course had eight teaching assistants to support the class management. The study was conducted according to the ethical guideline of Kagawa university. Informed verbal consents of students about participation were obtained before the first lesson.

B. Details of AL Strategies

In FY 2016, decision cards were introduced in the class. Students were asked to raise one of three color cards (blue, yellow or red) to answer each question from the instructor (Fig. 1). In FY 2017, following multi-step AL strategies by Nakano [10], group work activities were introduced in each lesson. The detail of the strategies in the class was depicted in Fig. 2 (left), compared with simple AL induction (right). For preparation of each lesson (excluding the first one), students were asked to turn in reaction papers to show what they learned and thought in the previous lesson and the instructor read all papers and selected some excellent ones. At the start of the class (first part), the instructor projected excellent papers on a screen to let

all students know the contents and to motivate them to write more excellent ones in the future. In the middle of the lesson, the instructor gave lecture on each economic theme, and students were asked to explain what they just learned each other in group.

After that, the instructor asked students basic related questions, and students answered by raising decision color cards (Fig.1). As the instructor provided additional lecture depending on students' responses, students could learn or collect more information about the topic. In the last part of the class, the instructor asked advanced questions, and students were asked to discuss in group to find an answer(s) and reasoning. Each group wrote the answer and/or the possible solutions on one sheet of paper. Among collected worksheets (up to fifty), the instructor selected some (up to ten) excellent ones and projected them to let all students know the contents. After class, students wrote reaction papers and turned in online (and then the next class started).

C. Organization of Groups for Discussion

Basically, discussion groups can be organized in three ways: (1) assemble by students themselves, (2) directed by an instructor, and (3) mixture of (1) and (2). Considering behavior problems of students in (1) by Nakano [10], in which student-oriented seating could lead some students to talk each other and to sit only at the backside of a classroom, plan (2) was chosen in this study. All seats were numbered as shown in Fig. 1 (x-mark: blank seat), and students were told to draw lots to decide where to be seated before the start of lesson. Each group consisted of three or five students in the same colored seats.

D. Text Analysis of Reaction Papers

All texts in reaction papers from participants were written in Japanese and were analyzed with Japanese version of KH coder (<http://khc.sourceforge.net/dl.html>). Top 20 frequent nouns were listed. According to collocation frequency, word pairs in texts were clustered. Since all Japanese data were translated into English, each translated Japanese word might contain multiple English components.

III. RESULTS AND DISCUSSIONS

A. Practice of AL Style Class

The economics course was conducted in an AL style according to multi-step instructive techniques in Fig. 2. At a glance, AL strategies in the course needed multiple times of interaction between the instructor and students (Fig.2, left). At the start of the course, students appeared anxious about the style such as designated seating system and multiple times of group discussions, but many of them gradually looked enjoying the course. The details of questions regarding topics of each lesson were discussed later (see III-B).

The point of the strategies was 'giving immediate and meaningful feedback right after group discussion.' By contrast, a typical case of unsuccessful AL style class was shown in the right of Fig.2. The authors called the case as 'Simple Introduction of AL' because instructors simply asked students to discuss what you learned today. Although that question is widely used for group discussion, lack of instruction for what and how to discuss the topic and lack of feedback from instructors would make it more difficult to facilitate interaction between instructors and students.

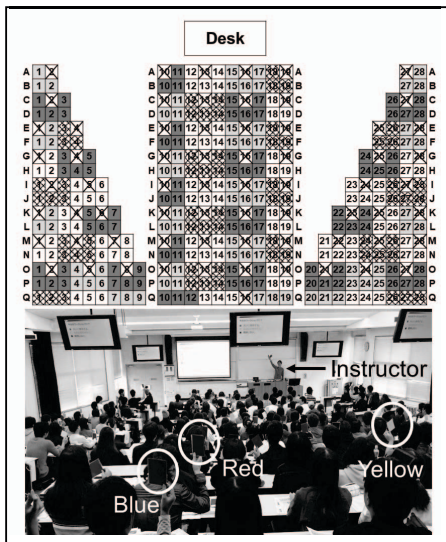


Fig.1. Seating plan (upper) and use of decision cards (lower) in the class.

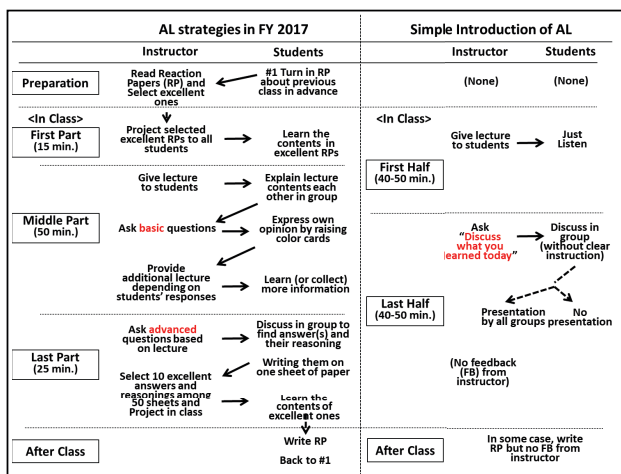


Fig.2. Comparison of AL Strategies in FY 2017 and Simple AL Introduction.

When looking back to the authors' class (Fig.2, left), the course management covered various techniques to facilitate instructor-students interactions, one of which was selection of several excellent worksheets after group discussion followed by projection of them. That could make students understand good points of excellent answers and motivate themselves to show their deeper thoughts on topics. Other techniques could be highlighted as careful watching of students' performance.

B. Appropriate Choice of Questions in the Class

Both basic and advanced questions were asked to be discussed in group during the class as shown below.

Question 1. The aging society with decreasing birthrate makes our life... (First Part; 5 min for thinking and discussion)

Ans.: Easy (blue), Difficult (yellow), No Change (red)

Q2. Discuss what is the most important element for sustainability in welfare state, welfare society and welfare policy. (Last Part; 10 min for group discussion)

Q3. If there is deposit money, economic transactions can be completed without cash. (At the end)

Ans: Understand (blue), Understand partially (yellow), No understand (red).

These three questions were asked in the lesson on welfare policy. Q1 as a basic one was aimed to ask students' recent perspectives on the current affairs. After small lecture on the topic, the advanced Q2 was asked as the main question for group discussion. Finally, Q3 was asked to know the level of understanding of the lesson. Decision cards could help instructor know trends of students' thoughts about the topics.

Q4. "Debt is bad thing; it should be as little as possible. Deposit (Savings) is good thing; it should be as many as possible." Are these ideas true or false? (Middle; 5 min)

Ans: True (blue), False (red), I don't know (yellow)

Q5. Does Economy (production, distribution and consumption) always need cash? Also show your reason. (Middle; 5 min)

These two questions were asked in the lesson on monetary policy. Q4 as a basic one was aimed to ask students' common senses about debt and deposit. After the lecture, Q5 was asked as an advanced one to check understanding of cash currency and deposit currency and attitudes on the topic.

From these examples, preparation of and combinatorial use of different levels (basic, advanced or intermediate) of questions were key to facilitate instructor-students interaction and group discussion. Some students referred to not only the contents of lessons but also these questions in reaction papers.

C. Text Analysis of Reaction Papers

At the end of each lesson, students were asked to comment on the topic that they learned at the class and turned in reaction papers online. From 297 students registered, median of 132 reaction papers (92-156) were collected. The authors focused on papers of the last lesson on welfare policy because they noticed that most of students referred to not only the topic but also class management. 72 (75.0%) out of 96 papers showed good understanding of the content of the lesson. All papers contained 44,830 characters, 202 phrases. Among a total of 1,083 nouns (329 kinds), top 20 frequent nouns were classified into three (Fig. 3). Economic policy (123 times), Pension (84), Knowledge (67) etc. reflected on the lesson contents, while AL (100), Group work (91), Opinion (87), Group (65) etc. highlighted AL strategy in the class. In addition, Lecture (214), Class (203), and I (myself) (111) were commonly used in texts referring to both the contents and how the instructor facilitate the lessons, indicating bidirectional interest of students.

When all words in the texts were analyzed according to their collocations, they were classified into seven groups. The broadest network was seen in Group 1, which contained Class, Think, AL, Economic policy, I (myself), Lesson, Group work, Learn, Opinion and so on, suggesting that participants had many opportunities to discuss and think deeply about main topics during the period. Group 2 consisted of words such as Pension system, Issue, Understanding and Listen, indicating good understanding of pension system. The components of other groups were, Subject and Good (G3), Teacher and Understand (G4), Important and Thinking (G5), Correct, Necessary, Lecture and Interesting (G6), Impression and Make (G7), implying that the lessons were impressive and the instructor insisted on the importance of being thoughtful with correct related knowledge.

In the reaction papers, students pointed out both positive and negative aspects about AL strategies in the class. The positive ones were highlighted as satisfaction and achievement through instructor-students interaction and group discussion. By contrast, the negative ones were derived from unsuccessful group discussion with unmotivated member and discomfort or concern for making group with strangers. Such students' actions to evaluate the class suggest that they studied hard with interest in the way of lessons as well as economic policy.

From the result mentioned above, it is of note that text analysis can make us easier to understand the contents of

reaction papers. Considering a large number of students in the class, analyzing hundreds of reaction papers from them can make instructors know the trend of what students feel and think in the class better than that in a small class.

Before AL implementation in the large economics class, reaction papers had been used as a remedy only for students who were supposed to fail the subject, but the authors are now trying to make scoring criteria of reaction papers for all students to evaluate their levels of understanding. Considering that only reaction papers of the last lesson were analyzed in this study, further longitudinal study of reaction papers is needed to evaluate students' performance throughout the course. To better decipher positive effects of AL strategies in the large class, a comparative analysis of reaction papers between pre- and post-implementation period is underway.

D. Overcoming Difficulty in Managing AL Style Large Class

Even if there are several good models of AL style large class, it is still difficult for an instructor to implement the strategies in the class by oneself. As shown here, recruitment of teaching assistants can make this type of class management easier. Morikawa [11] suggested the needs of training of teaching assistants for cooperative learning in a large-enrollment class, because most of them have not experienced this type of learning. Moreover, levels of teaching assistant involvement in class management would be one of issues that needs further discussion.

Most of previous studies described only what kind of and/or how AL style lessons are applied, still lacking focus on interactions between an instructor and students. And data of comparison between lecturing style lessons and AL style lessons are limited. Continuous collection of evidence for AL style large class can help many instructors who are interested in that kind of class management.

IV. CONCLUSION

Firstly, the authors showed the detailed design of AL strategies in a large-enrollment class. The point was to give immediate and meaningful feedback right after group discussion depending on students' responses. Visualization of the design showed multiple times of instructor-students interactions, which made a big difference in facilitating large class in contrast to simple introduction of group discussion. Secondly, well-designed questions were important for active group discussion. The authors presented several examples at different levels, and showed that appropriate choice of these questions could facilitate the large class. Thirdly, text analysis of a large number of reaction papers revealed that students were impressed by both AL style lessons and the course contents. Still needed further investigation, this kind of analysis could help instructors comprehend students' levels of understanding and reflect on their own courses.

Taken together, the stepwise design of and well preparation for AL style class could help instructors accomplish large class management, which might be applicable to large classes of disciplines other than economics. If instructors are eager to

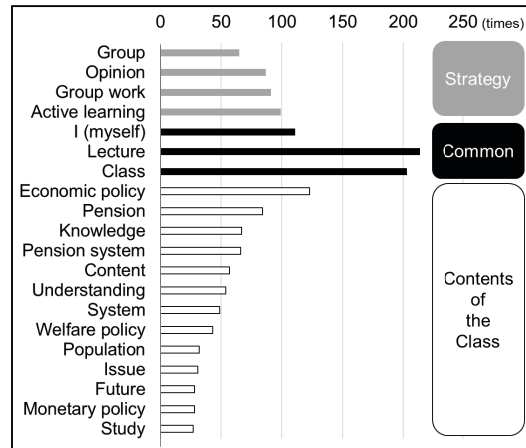


Fig.3. Top 20 frequent nouns in texts analyzed.

make students work and study actively, they must work very actively (i.e. give immediate feedback).

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