Educational practice using a clicker-based real-time classroom response system in the introduction to psychology course − Quantitative research for university students −

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Abstract

In this research, we introduce clicker which is a real-time classroom response system in the liberal arts students of the first year immediately after entrance to the university called introduction to psychology course, and showed concrete examples of introduction, and measured the effect of clicker through comparison between used group and non-use group. As a result, a higher rating was obtained from the clicker use group than the clicker non-use group. In this study, we attempted to introduce active learning using a real-time lesson response system in the liberal arts of psychology overview, but by using the clicker tool, we can see how to prepare what kind of questions "It is thought that the point which became the opportunity to think deeply is significant". There are various ways to get students' response in addition to clickers. For example, active learning can be realized also by making a hand rising on the spot, accepting questions individually or asking a small report subject. However, by demonstrating the effectiveness of the clicker as a teaching material having both anonymity and immediacy in the future by comparing it with other teaching materials in the future, the position of the teaching material called clicker in educational practice research will becomes clear.

Introduction

Previous research [1] has shown how the introduction of a clicker-based real-time classroom response system (hereinafter "clickers") in medical administration courses delivered in large classrooms improves students' lesson evaluations and motivation for learning, suggesting the potential of such systems as a new form of active learning. On the other hand, as a future challenge, we must address the remaining questions of whether clickers will show the same effects in every course, or else whether their effects might differ according to the nature of the course. Also, while previous research [1] analyzed third-year university students who had already acquired a degree of basic knowledge, they predicted that the introduction of clickers might also reduce obstacles in liberal arts courses for first-year students who have just entered university. Moreover, another challenge left by previous research [1] is they failed to carry out any comparison of students who used clickers with those who did not (i.e., a control group).

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Therefore, in this study, introduced the use of a real-time classroom response system into a liberal arts course, "Introduction to Psychology", intended for first-year students who have just entered university to measure the effect of clickers by comparing a group who used clickers (use group) and a group who did not (non-use group).

The attempts called "peer instruction" using clickers are one of active learning classes [2], and are being practiced also in Japanese educational institutions and the like. Peer instruction is a class incorporating discussion between students, first let students prepare, prepare for the problem using clickers, then respond to the same problem again using clickers through student discussions It is a technique called [2]. Such methods are mainly practiced in specialized basic subjects of science, such as physics and chemistry [2], and there are many cases where clickers are introduced in basic courses of large classrooms. In addition, for example, one of the objectives of learning is to encourage discussion among students by casting conceptual questions that are not correct in liberal arts subjects such as psychology, and to think and understand themselves with their own heads There are examples [2], it can be said that this way of using is effective use of clickers.

In this research, we introduce a real-time classroom response system in a liberal arts subject "Introduction to Psychology" attended by a first grader immediately after entering university and measure the effect of clicker through comparison between used group and non-use group.

Materials and Methods
1. Target students

The study involved 173 first-year university students enrolled in the liberal arts course offered in the first semester of the 2017 school year at a private Japanese university in N prefecture.

Because the experiment was unsigned and completely anonymous, the ratio of male and female and age are unknown, but the age was approxi-mately 18 to 19 years old. In addition, the control group and the experiment group were completely randomly arranged.

2. Target lessons

The course involved in this study was "Introduction to Psychology", an elective course, and one of several liberal arts courses offered to all first-year students across the university. The course is conducted in a lecture-based format, and consists of a total of eight class periods lasting 90 minutes each. The aim of the course is to provide students aspiring to careers in the medical and welfare sector (e.g., as nurses, physical therapists, certified social workers, or medical administration staff) with an opportunity to gain an extensive surface familiarity with psychology, which is thought to also be helpful in the professional fields they will pursue in future. The lesson involved in this study was the fourth class in the course, which dealt with "The Subconscious, Personality, and Psychological Testing." The aim of the lesson was for students to gain comprehension about the human subconscious and dream analysis, as well as human personalities and psychological testing (the psychology of personality). The textbook used for this course was Psychology navigator [3].

It is worth noting that the "Introduction to Psychology" course covered a different academic discipline than students' professional fields, and was in addition a liberal arts course. Accordingly, rather than acquiring a high level of expertise, a principal goal of the course was for students to have curiosity and interest in psychology as a field of inquiry, and to adopt an attitude of active involvement in the learning process.

3. Lessons employing clickers

Students used their clickers for the first time during the fourth class of the "Introduction to Psychology" course. In addition, since the number of clickers available to the teacher was limited (about 100), the clickers were randomly distributed to

students by the teacher at the beginning of lesson. Also, it was explained by the teacher at the beginning of lesson that the anonymity of students who received the clickers would be fully guaranteed, and that the decision of whether to use the clickers or not was voluntary on their part.

4. Clickers used in the study

The study employed response card RF receivers used in the TurningPoint® system developed by Keepad Japan Co. Ltd.

5. Student lesson evaluation questionnaire

Students were asked to complete a lesson evaluation questionnaire at the end of the lesson in which the clickers were introduced. Items of the lesson evaluation questionnaire of the following 18 items are a total of 5 grades with the author adding three (16 to 18) to the one created by Taniguchi [4] (1 to 15).

6. Ethical considerations

In this study, the use of clickers by students and responses to the lesson evaluation questionnaire were all carried out anonymously and on a voluntary basis. In addition, it was clearly explained that the decision to participate in the study or not would have absolutely no bearing on grading. In addition, this series of study proposals was submitted to and approved by the Ethics Committee of Niigata University of Health and Welfare prior to the study's implementation (Approval No: 17765-161220).

Results

Now, we would like to review the actual slides prepared for use with clickers in their order of appearance. Because this lesson dealt with material on the theme of "The Subconscious, Personality, and Psychological Testing," the teacher began with the simple question, "Which sleep state is associated with dreaming?". Although this slide was initially created to ascertain the degree to which students

were knowledgeable about dreams, based on these results, little other effect appears to have been particularly evident aside from the teacher's impression that the students were quite well informed about dreams.

Next, as an example of Sigmund Freud's dream analysis, students were asked to conduct an analysis of the following dream.

She was sitting with her husband in the theater; the one side of the stalls was quite empty. Her husband tells her, Elise and her fiancé had intended coming, but could only get some cheap seats, three for one florin fifty kreuzers, and these they would not take. In her opinion, that would not have mattered very much [3].

The results of using clickers to collect analyses by students about this dream analysis actually conducted by Freud. Since Freud's own analysis is summarized in option 2 ("Dissatisfied with her husband and unfulfilled in her marriage"), almost half of the students selected the correct answer. However, since the majority of students gave a different answer, based on the clicker results, the teacher proceeded to deliver the lecture by explaining the grounds for why the second option was the correct one. With regard to the effects of the clickers in this scenario, it seems that students were not only allowed to analyze the dream themselves, but once the validity of their own analysis was made clear through the use of the clickers, they were prompted to listen more closely to the lecture explaining why the second option was the correct answer.

Next, in order to describe "typical dreams" considered to express the peculiar workings of the psychological subconscious, students were asked about their own experience of dreaming. To the first question, "Have you ever dreamed that someone or something was chasing you?", 84% of students answered affirmatively. Next, to the question, "Have you ever dreamed that you could fly?", 69% of students responded "No". In addition, to the question, "Have you ever dreamed about losing teeth?", 71% of students answered that they had

not.

From the lecture on typical dreams that the teacher delivered after these responses, students were able to learn about the deep psychology of the subconscious underlying their own dreams. Moreover, to the same questions about typical dreams, the significant differences in the proportions of students reporting having experienced such dreams clarified whether they were in the majority or minority in this respect, and it seemed that students were able to listen with greater interest to the meanings held by their respective dreams.

Next, in line with the theme of "Questions about Dreams," students were asked to use their clickers to answer the question "Do dogs and babies also dream?". As a result, 85% of students responded "1. Yes".

Although the correct answer to the question is "yes," it is normally good practice with regard to questions on which opinions are split to develop the discussion by asking students why they answered one way or the other. Nevertheless, on this occasion (in part because most students answered correctly) the discussion only went as far as talking about why "yes" was the correct answer.

In this study, in order to compare lesson evaluations by students who used the clickers with those of students who had not used the clickers (the control group), both groups were asked to complete the same 18-item lesson evaluation questionnaire. Table 1 lists the results of t-test comparison and analysis of the mean rating for each question item.

As a result, a significant difference was observed at the 5% level for nine of the 18 items, with students who had used clickers returning a more positive evaluation for all items than students who had not used clickers. Especially when focusing on "18. Overall, I can give this lesson a high evaluation," while it is certainly possible that this was an effect of factors other than the clickers, given that signifi-

Table 1. Mean values, standard deviations, and t-values for each student lesson evaluation item.

	Clicker use group (N = 88)	Clicker non-use group (N = 85)	t-value
(1) The lesson was easy to follow.	4.57(0.66)	4.31(0.77)	2.46*
(2) The teacher's enthusiasm was evident.	4.26(0.75)	4.16(0.77)	0.84
(3) The goals, lesson plan, and method of grading for the course were clear.	3.90(0.94)	3.74(0.91)	1.11
(4) The goals of the lesson and points made were clear.	4.24(0.80)	4.14(0.90)	0.79
(5) The pace of the lesson was appropriate.	4.53(0.74)	4.35(0.90)	1.45
(6) The teacher's manner of speech was clear and easy to hear.	4.48(0.80)	4.40(0.85)	0.62
(7) The texts, handouts, and audiovisual materials were easy to understand.	4.55(0.69)	4.16(0.86)	3.22**
(8) I engaged in the lesson actively and willingly.	4.42(0.83)	4.18(0.84)	1.91
(9) I became more interested in the course content.	4.67(0.62)	4.38(0.86)	2.57*
(10) I deepened my comprehension of the course content.	4.60(0.62)	4.27(0.81)	3.03**
(11) The teacher was sufficiently prepared for the lesson.	4.57(0.72)	4.29(0.86)	2.28*
(12) The lesson was delivered in an atmosphere that stimulated student questions.	3.63(1.02)	3.61(1.00)	0.09
(13) The number of students was appropriate.	4.05(0.95)	4.00(1.02)	0.30
(14) I read ahead or did review work for this lesson.	1.89(1.14)	2.20(1.21)	1.76
(15) I learned new knowledge and skills.	4.39(0.70)	4.04(1.03)	2.63**
(16) I think that teachers should use clickers in their lessons.	4.50(0.74)	4.04(1.10)	3.25**
(17) I would like to use clickers in the lessons that I take.	4.59(0.71)	4.11(1.10)	3.46**
(18) Overall, I can give this lesson a high evaluation.	4.60(0.58)	4.33(0.78)	2.61*

**$p<0.01$ *$p<0.05$

cant differences were also found for "16. I think that teachers should use clickers in their lessons" and "17. I would like to use clickers in the lessons that I take," it seems that the students who used clickers were highly appreciative of the clickers themselves.

In addition, given that use group gave higher evaluations than the non-use group for "9. I became more interested in the course content" and "10. I deepened my comprehension of the course content," it is conceivable that the use of clickers led to a deeper interest and comprehension of the course content of "Introduction to Psychology". This is consistent with the lesson goals for "Introduction to Psychology" listed in section 2 of the Methods above (Table 1).

Discussion

This study involved the introduction of a clicker-based real-time classroom response system into "Introduction to Psychology," a liberal arts course taken by first-year students who have just entered university. As well as detailing a specific case of such introduction, it also attempted a comparison of lesson evaluation questionnaire results from a group that used the clickers (use group) and a group that did not (non-use group). As a result, a higher evaluation was obtained from the use group than from the non-use group.

Active learning, according to Mizokami [2] "is a form of learning that transcends the idea of learning as listening to lessons that assume a unidirectional transfer of knowledge by involving activities such as writing, speaking, and presenting and the attendant externalization of cognitive processes arising from such activities." Additionally, Kobayashi and Narita [5] state that "externalization is an important keyword that refers to transmitting one's own understanding and ideas beyond the self by writing and speaking to generate feedback from yourself about your own ideas." In line with these definitions, the introduction of clickers into the "Introduction to Psychology" lecture

course discussed in this study, through the action of having students use their clickers to transmit information in addition to the teacher lecturing students unidirectionally, can be said to have achieved active learning.

While this study attempted to introduce active learning using a real-time classroom response system in the context of the liberal arts course "Introduction to Psychology," the use of clickers as a teaching tool may be considered to have considerable significance in terms of providing an opportunity for teachers to think more deeply about what kinds of questions to prepare beforehand. There are in addition various other methods of obtaining responses from students aside from clickers. For example, active learning can be achieved by such means as asking students for a show of hands in the lesson, taking individual questions, or tasking students with small report assignments. Nevertheless, in the future, by continuing to demonstrate the effectiveness of clickers as a teaching tool that combines both anonymity (which facilitates answering even delicate questions) and immediacy (ability to produce an immediate aggregate graph of responses on the spot) through repeated comparison with other teaching tools, I believe that the positioning of the clicker as a teaching tool in a study of educational practice will become clear.

In this research, we found a possibility to realize bidirectional lesson in large classroom by introducing clicker in lecture for more than 100 students, but the necessity will be sufficiently examined in the future. When clickers are used, it is common to create slides before class. However, depending on the progress of the lesson, the ability to cope with facing faculty change when facing flexible response is required. In addition, although this research targeted first-year students, comparison and examination with senior students are left. For each question item, it is also necessary to enhance the validity and reliability by repeatedly conducting additional experiments.

We hope that this research will develop into re-

search that will fill the gap in the academic field of "utilization of information devices" in teaching methodology.

Conflicts of Interest

The clickers used in this study were all purchased using personal research expenses provided by the author's home university, and I affirm that I have not received any "provision of research funds," "provision of research equipment," "intellectual interests such as patent applications or patents pending," or "practical assistance such as with data collection or analysis" from the companies responsible for the manufacture and/or sale of the clickers.

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