

Educational Effectiveness of the Lecture using Animated Figures for Beginner's Programming Course in the University

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Abstract: In education, lecture is required to use computer software such as PowerPoint, flash, and so on. One of the utilization purposes of this is education effect improvement. Usually, showing animated figures is said to be good for education. So, many education systems using animated figures have been proposed. However, only few attempts have so far been made at discussion of these effects. Especially, it has not been comparing the education system using animated figures with the chalk talk. So, we research effects of a lecture using animated figures. This is a comparative research of a lecture using animated figures and a chalk talk lecture in a beginner's programming education course of university. Students of beginner's programming education course have been divided into three groups. We focus on only two groups of these. One of the groups is shown program behavior by Microsoft PowerPoint animations and follows the program statements step-by-step and show changing values of program variables by abstraction figures. Another group is a chalk talk lecture. Each group is the same syllabus, same assignments, same practical training, same final examination and same impressions questionnaire of lecture. So, difference of each group is only representation method. Thus, the proficiency effect of using animated figures is appears in a final examination. And, other effects (such as the desire to learn, satisfaction and so on) appear in the impressions questionnaire. We shows check five year's worth of the final examination and the impression questionnaire. As a result, this research has a little advantage of the lecture using animated figures in the representation method in this example. However, it does not show definite advantages of the lecture using animated figures.

Keywords: Computer aided education, E-Learning, Programming Education, Education Impression, Animated Figure

1 INTRODUCTION

In education, lectures are required to use computer software such as PowerPoint, flash, and so on. Usually, showing animated figures is said to be good for education in physics and geometry. Animated figures using computer can visualize an invisible motion of the physical laws like tiny or huge object motion. So, learners can understand invisible motions.

Usually, an execution of computer program just only shows results of program. Therefore, a behavior of computer by the program is invisible. Nevertheless, computer programming learner is required to understand behavior of computer by a program.

So, some system which shows a computer behavior by a program has been proposed. For example, one of the proposed systems is "Proposal of Program Text Markup Language through Program Visualization Tool" and "Effective IT Learning Method Using Schematic Diagram Approach", which shows a behavior of a program [1][2]. And, VisuSim has been proposed, which is a visual computer simulator for education [3]. In addition, many teachers have made one-of-a-kind animated figures which show the behavior of computer by a program for education. However, many education systems using animated figures

have been proposed. However, only few attempts have so far been made about the effectiveness of this method.

So, we researched effectiveness of a lecture using animated figures for the programming education. This class is teaching JAVA programming for beginner. Students of this class divide into three groups and each class are same syllabus, same practical exercise and same final examination. One of the group's lectures is using animated figure of program behavior. Other group's lecture is chalk-talk (using blackboard). So, we checked differences of each class.

The proficiency effect appears in evaluations of learning result. And, other effects (such as the desire to learn, satisfaction and so on) appear in impression questionnaire. Therefore, differences of the evaluations of learning result and the impression questionnaire are effects of a lecture showing animated figure for programming education.

In this paper, we report a comparison of evaluations of learning results and impression questionnaires in a JAVA programming education class for beginner in our university for five years for checking effects of lecture using animated figure.

2 BASIC IDEA

Checking effectiveness of animated figures for a lecture requires several divided groups of students which have same syllabus but just only presentation method is different. So, we focused on a beginner programming education course in our university. The exercise lesson (such as the programming exercise) requires tutorial process. In this case, too many students in a classroom make it difficult to program tutorial exercise. Thus, the exercise lesson consists of a small group of students.

However, even if these are several groups of students in class, usually these have same syllabus in our university. Therefore, an exercise lesson in our university is same lesson content, same exercise program, same final examination and same grade point assessment criterion of the academic achievement commonly. In this case, the difference of each group is just only the method of lecture by teachers. If one of the teacher using animated figures and another teacher using only blackboard in lecture, checking the academic achievement and the impression questionnaire is appearing differences of each other. These differences mean the effectiveness of a lecture using animated figures.

3 SURVEYED COURSES

We researched a class of the programming training course for beginners in our university. This class is teaching JAVA programming for beginner. The process of this class lesson is showed as follows;

- 1st: Teacher teaches today's content of a lecture.
- 2nd: Students take practical studies to JAVA programming assignments.

Students of this class divide into three groups and each class are same syllabus, same practical exercise and same final examination. One of the group's lectures is using animated figures of a program behavior. Other group's lecture is chalk-talk (using blackboard). And these classes have same lesson content, same exercise program, same final examination and same grade point assessment criterion of the academic achievement commonly. An image of the surveyed course is shown in Fig 1.

So, we focused on the two groups. Group A is using the power point animated figures. But Group B is using only black-board (Static figure). The difference of final result of Group A and Group B means effectiveness of the lecture using animated figures. In addition, this course has the

impression questionnaire at the day of the final lecture. Thus, effects of the desire to learn, satisfaction and so on appear in impression questionnaire. So, we have checked the final result and the impression questionnaire of these classes for five years.

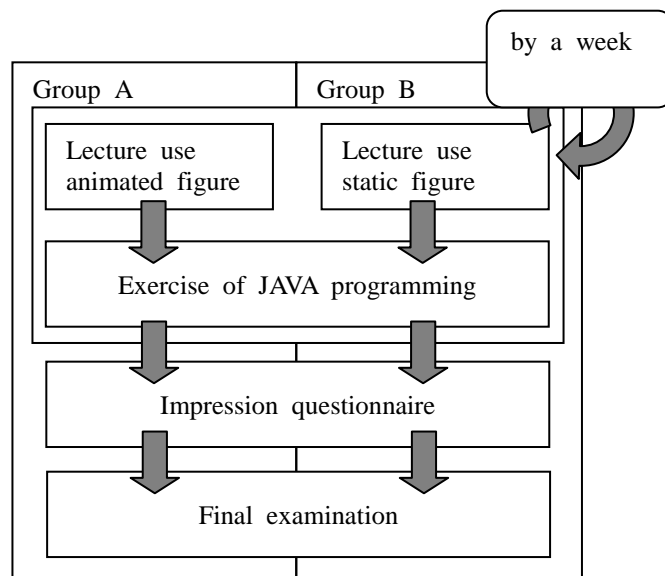


Fig. 1. An image of surveyed course

4 RESULTS

Table 1 shows the highest point, the lowest point, the standard deviation and the average of the final result of two groups for each five years. The maximum of this final result points is 113 and minimum of this points is 0. Table 1 shows Group A and Group B were similar result points.

Table 1. Final result of two groups for each five years

Year	Group	Average	Highest point	Lowest point	Standard deviation	Number of Sample
2007	A	88.6	112	8	17.2	46
	B	82.3	110	5	21.4	45
2008	A	83.0	112	0	22.3	62
	B	83.6	111	0	22.9	30
2009	A	72.3	102	0	21.3	64
	B	83.3	111	0	19.8	66
2010	A	89.6	108	0	19.2	63
	B	82.3	112	0	25.7	65
2011	A	85.0	111	0	22.0	46
	B	83.6	112	0	22.9	43

Table 2. Impression questionnaire of two groups for each five years

Questions	Were you able to understand lecture contents?		Were you able to learn new knowledge?		Was the speech skill of a teacher good for you?		Was the expression method plain for you?		Was the class executed according to syllabus?	
	A	B	A	B	A	B	A	B	A	B
2007	4.1	4.1	4.6	4.5	4.4	4.4	4.1	4.1	4.2	4.2
2008	4.1	4.1	4.3	4.5	4.4	4.3	4.1	4.2	4.1	4.3
2009	4.1	4.1	4.4	4.4	4.4	4.1	4.3	4.0	4.2	4.0
2010	4.1	3.9	4.6	4.4	4.6	4.1	4.2	3.8	4.3	4.0
2011	3.9	4.2	4.3	4.3	4.1	4.4	3.9	4.2	4.1	4.4

Questions	Was the volume of a lecture appropriate for you?		Were enthusiasm and good faith of a teacher felt for you?		Did the teacher deal with a question of a student faithfully?		Was it a valuable class for you?		As for you, did learning will increase by having attended this class?	
	A	B	A	B	A	B	A	B	A	B
2007	4.3	4.0	4.4	4.3	4.6	4.3	4.5	4.4	4.4	4.3
2008	4.0	4.3	4.3	4.2	4.4	4.5	4.4	4.5	4.3	4.2
2009	4.2	4.1	4.4	4.2	4.5	4.3	4.5	4.2	4.4	4.1
2010	4.3	4.1	4.5	4.2	4.7	4.0	4.6	4.4	4.3	4.1
2011	4.1	4.4	3.9	4.4	4.0	4.4	4.2	4.4	3.9	4.1

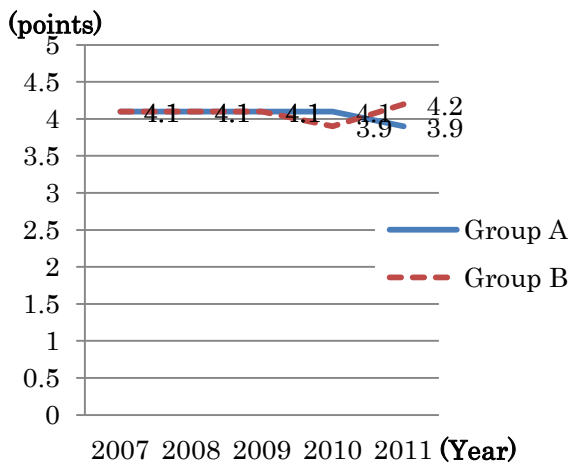


Fig. 2. Answer of question “Were you able to understand lecture contents?”

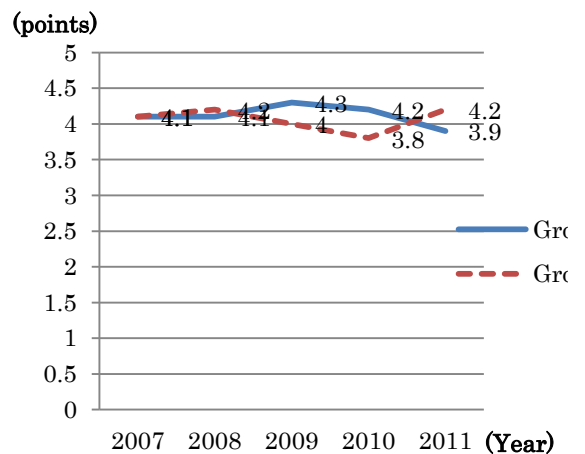


Fig. 3. Answer of question “Was the expression method plain for you?”

Table 2 shows the average of the impression questionnaire of two groups for each five years. This questionnaire is written in Japanese. The maximum of this point is 5 and minimum of this point is 0. Table 2 shows Group A and Group B were similar points.

The educational effectiveness of understanding appears as answers of the question "Were you able to understand lecture contents?" of a questionnaire. So, we show this answer of questionnaire in Fig.2.

The educational effectiveness of using animated figures appears as answers of the question "Was the expression method plain for you?" of a questionnaire. So, we show this answer of questionnaire in Fig.3.

5 CONSIDERATIONS

From Fig. 1 and Fig. 2, the understanding of learning fluctuates by each year. However, it is almost the same in the Group A and the Group B.

And, from Fig. 3, the expression method of Group A was a little higher. However, it has not shown definite advantages of lecture using animated figures.

In this research, the final result and the impression questionnaire of Group A and Group B are similar. This result means an educational effectiveness of a lecture using animated figures and a lecture using static figures is similar.

We consider a reason of this result is the effect of practical exercises. The practical exercise is more effective in this research. Therefore, more effective programming education requires an improvement of a practical exercise.

6 CONCLUSION

In this paper, we report a comparison of evaluations of learning results and impression questionnaires in a JAVA programming education class for beginners in our university for five years for checking effects of a lecture using animated figures.

In this research, an education effect of a lecture using animated figure and a lecture using static figure is similar. So, it has not shown the definite advantage of lecture using animated figures.

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