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Practice of Cooperative Learning of Knowledge Construction Online and Learner's Attitude

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Abstract: Cooperative learning is important by some students. However, in Japan, the number of small classes has increased in schools, and it is difficult to conduct cooperative learning in small classes. This study aims to design an effective approach toward cooperative learning of knowledge construction online. Therefore, a tool was developed for learning through the jigsaw method online (OnlineJigsawSystem). Through a questionnaire survey, the study compared the learner's attitude toward cooperative learning with the jigsaw method using the OnlineJigsawSystem and cooperative learning with the normal style of the jigsaw method. The results suggest that the learner's attitude toward emotion is almost the same with both approaches. However, there are some problems with "Motivation" and "Human relationship."

Keywords: jigsaw method, cooperating learning, e-learning, Distance learning, Asynchronous

1. Introduction

Small classes in Japan have increased as the country's population has declined. However, it is difficult to conduct cooperative learning in a small class. It has been said that cooperative learning that occurs through the use of information and communications technology (ICT) is important in Japan. Thus, cooperative learning is a method that all students should experience even if they are in a small class. Studies have been conducted on cooperative learning in the field of learning science. In such a situation, jigsaw method which is one of cooperative learning has been attracting attention. Y. Miyake and N. Miyake (2014) determined that the jigsaw method establishes a situation in which each learner 1) takes charge of different learning contents, 2) aims at becoming an expert on the given contents through cooperating with group members (expert group), 3) discusses the given contents with others in the group constituted by one person from the expert group (jigsaw group), and 4) achieves the learning goals. Further, it is a general to answered a learning task in this class before and after learning to check the learning effect. Anzai et al (2013) and Suto et al (2012) investigated learning effects from the jigsaw method by conducting practical studies. These studies were undertaken with a sufficient number of learners; however, this method is not suitable for small classes. Therefore, we hypothesize that it is possible to solve this problem by conducting cooperative learning through the jigsaw method by connecting small classes with each other online. Kurata et al (2014) developed a system for employing cooperative learning with the jigsaw method online (OnlineJigsawSystem). Furthermore, Kurata et al (2015) showed the learning effects related to the extent of interaction among learners through practical studies using the OnlineJigsawSystem. However, although studies have examined some learning effects from using the OnlineJigsawSystem, learner's attitude has not been investigated. This study aims to reveal the learner's attitude toward this approach by having a class use the OnlineJigsawSystem. Therefore, we conducted and analyzed a questionnaire regarding the learner's attitude after a class had used the OnlineJigsawSystem.

2. OnlineJigsawSystem

Usually, the jigsaw method is face-to-face. The online system, however, has adopted the sharing of videos that describe the learning content and allow commenting online instead of direct discussion among learners. The OnlineJigsawSystem supports these activities online. The first step involves uploading a file for learners to respond to the learning task. The second step is to create a video for expert activity after learners have learned the given material. The third step comprises learning by viewing the videos shared in the expert group and discussing online in the expert group. Furthermore,

learners create a video to improve their own video again. The fourth step involves learning by viewing videos shared in the jigsaw group and discussing online in the jigsaw group. The fifth step involves uploading the file for responding to the learning task again.

3. Practice and Survey

A comparative questionnaire survey was conducted in a group using the normal style of the jigsaw method (Control group) and a group using the jigsaw method with the OnlineJigsawSystem (Experimental group). The learning contents were materials regarding a survey on the use of ICT. Furthermore, we split the learning materials into three. The period of the survey was July 8 and 15 and 22, 2014. The subjects of the survey were 12 university students in the Faculty of Education. The learning place was a PC classroom. How to teach with each other by learners in the Control group was the style of presentation by using PowerPoint. There were question-and-answer and comment sessions after each presentation. The period of the survey was July 14–28, 2014. The subjects of the survey were 12 university students in the Faculty of Education. Learning time and learning place is free. How to create video is saving video file consisting of slides and audio by PowerPoint. Upload timing is free. We set a deadline for each of the activities. We undertook a questionnaire survey based on a 4-point scale (4: I think quite so, 3: I think so comparatively speaking, 2: I do not think so much, 1: I do not think at all) concerning the emotion related to learning after all of the learning is over. This study defined an answer of 4 or 3 as a positive evaluation, and an answer of 2 or 1 as a negative evaluation. Questionnaire contents concerned "Motivation," "Positiveness," "Sense of responsibility," "Human relationship," "Confidence," "Pressure," "Relaxation." The same questionnaire was conducted in the experimental group and control group. A T-test was done to compare the experimental and control group's evaluation. Furthermore, Fisher's exact test was implemented to compare positive and negative evaluations.

4. Result

The number of valid responses by the experimental group was 24, and the number of valid responses by the control group was 11. On average, results of the questionnaire regarding "Motivation" were approximately 2.8 points in the experimental group, and approximately 3.2 points in the control group. The control group had a higher evaluation value than the experimental group, and there was a significant difference between the groups ($F(1,33) = 4.34$, $p<.05$). Moreover, the positive evaluation was significantly higher than the negative evaluation in both groups (experimental group: $p = 0.0066$, two-sided test) (control group: $p = 0.0010$, two-sided test). On average, results of the questionnaire regarding "Positiveness" were approximately 3.1 points in the experimental group, and approximately 3.2 points in the control group. There was no significant difference between the groups ($F(1,33) = 0.07$, ns). Moreover, the positive evaluation was significantly higher than the negative evaluation in both groups (experimental group: $p = 0.0003$, two-sided test) (control group: $p = 0.0117$, two-sided test). On average, results of the questionnaire regarding "Sense of responsibility" were approximately 3.5 points in the experimental group, and approximately 3.6 points in the control group. There was no significant difference between the groups ($F(1,33) = 0.44$, ns). Moreover, the positive evaluation was significantly higher than the negative evaluation in both groups (experimental group: $p = 0.0000$, two-sided test) (control group: $p = 0.0010$, two-sided test). On average, results of the questionnaire regarding "Human relationship" were approximately 2.5 points in the experimental group, and approximately 3.2 points in the control group. There was no significant difference between the groups ($F(1,33) = 5.80$, $p<.05$). Moreover, there was no significant difference between the positive and the negative evaluation (experimental group: $p = 0.8388$, two-sided test) (control group: $p = 0.2266$, two-sided test). On average, results of the questionnaire regarding "Confidence" were approximately 2.5 points in the experimental group, and about 2.5 points in the control group. There was no significant difference between the groups ($F(1,33) = 0.00$, ns). Moreover, there was no significant difference between the positive and the negative evaluation (experimental group: $p = 0.8388$, two-sided test) (control group: $p = 1.0000$, two-sided test). On average, results of the questionnaire regarding "Pressure" were approximately 2.9 points in the experimental group, and approximately 3.3 points in the control group. There was no significant difference between the groups ($F(1,33) = 2.09$, ns). Moreover, the positive evaluation was significantly higher than the negative evaluation in the control group (experimental group: $p = 0.1516$, two-sided test) (control group: $p = 0.0010$, two-sided test). On average, results of the

questionnaire regarding “Relaxation” were approximately 2.5 points in the experimental group, and approximately 2.7 points in the control group. There was no significant difference between the groups ($F(1,33) = 0.26$, ns). Moreover, there was no significant difference between the positive and the negative evaluation (experimental group: $p = 0.3075$, two-sided test) (control group: $p = 1.0000$, two-sided test).

5. Discussion

It was revealed that there were no differences in the learner’s attitude regarding “Motivation” and “Positiveness.” Moreover, the positive evaluation was higher than the negative evaluation in both groups. Therefore, cooperative learning with the jigsaw method using the OnlineJigsawSystem is equivalent to a high positive attitude toward cooperative learning with the normal style of the jigsaw method. However, for cooperative learning with the jigsaw method using the OnlineJigsawSystem, the learner’s “Motivation” is lower than for cooperative learning with the normal style of the jigsaw method. It will be necessary to set the learning task so that learner’s interest increases in the future. It was revealed that there were no differences in the learner’s attitude regarding “Sense of responsibility.” Moreover, the positive evaluation was higher than the negative evaluation in both groups. Thus, cooperative learning with the jigsaw method using the OnlineJigsawSystem was equivalent to the attitude of high proactive participation in cooperative learning with the normal style of the jigsaw method. It was shown that cooperative learning with the jigsaw method using the OnlineJigsawSystem was lower for the learner’s attitude regarding “Human relationship” than cooperative learning with the normal style of the jigsaw method. It will be necessary to set the mechanism so that the learner’s social presence increases in the OnlineJigsawSystem in the future. It was revealed that there was no difference in the learner’s attitude toward “Confidence.” Thus, cooperative learning with the jigsaw method using the OnlineJigsawSystem is equivalent to the learner’s attitude toward confidence in cooperative learning with the normal style of the jigsaw method. It is necessary for learners to practice a lot to make presentations with confidence both online and face to face. It was revealed that there were no differences in the learner’s attitude regarding “Pressure.” Moreover, the positive evaluation was higher than the negative evaluation in the control group. Therefore, cooperative learning with the jigsaw method using the OnlineJigsawSystem is equivalent in pressure to giving a presentation in cooperative learning with the normal style of the jigsaw method. However, it was suggested that giving a presentation face to face reliably creates pressure on the presenter. It was revealed that there were no differences in the learner’s attitude toward “Relaxation.”

6. Conclusion

We developed the OnlineJigsawSystem and designed an approach to learning using the OnlineJigsawSystem to enable the cooperative learning of knowledge construction online. Furthermore, we investigated the learner’s attitude toward the design of effective cooperative learning of knowledge construction online. The results suggest that the learner’s attitude toward emotion is almost the same with both approaches. However, there are some problems with “Motivation” and “Human relationship.” We will improve the OnlineJigsawSystem and the learning design to achieve effective cooperative learning of knowledge construction online.

References

Shin Kurata, Takashi Fujiki, Masao Murota (2015). Practice of Cooperative Learning of Knowledge Construction in Online and the Amount of Interaction Among Learners : Research report of JSET conferences, 15(1), 209-216. (in Japanese)

Shin Kurata, Takashi Fujiki, Masao Murota (2014). Development and Evaluation of the learning environment for VOD type jigsaw method : Program of the 30th Annual Conference of JSET, 703-704. (in Japanese)

Takao Suto, Haruhiko Fujii (2012). Considerations of results and problems on collaborative learning by means of the jigsaw method : A case of Information Studies teachers' training : Japan Society of Educational Information, 28(2), 15-26. (in Japanese)

Yoshio Miyake and Naomi Miyake (2014). Educational Psychology Introduction : NHK (in Japanese)

Yuki Anzai, Hiroyuki Masukawa and Yuhei Yamauchi (2013). The Structure of Activity Model for Workshops to Generate Creative Collaboration (Evaluation of The Analogical Jigsaw Method) : Japan Journal of Educational Technology, 37(3), 287-297. (in Japanese)