



A Study on the Effectiveness of Comment Writing Instruction in Peer Evaluation Activities

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Abstract

The purpose of this study was to implement a lower secondary school science class that incorporates learning activities using a mutual evaluation sheet and to examine the effects of teaching comment writing in peer evaluation activities. The peer evaluation activity is a learning activity in which learners engage in self-evaluation and mutual evaluation of their discussion description using evaluation criteria, reflect on their description based on the evaluation results, and attempt to improve their description. In this study, the effect of comment writing instruction was examined by conducting peer evaluation activities in the class and analyzing the evaluation scores and evaluation comments. As a result, it was suggested that the evaluation comments made by the learners to others who received the comment writing instruction in peer evaluation activities had the effect of encouraging them to improve their description.

Keywords: *Peer evaluation, Evaluation comments, Comment writing instruction*

1. Introduction

The commentary to the science section of the Courses of Study in Japan, which is the curriculum standard based on the law, indicates that it is effective to conduct peer evaluation in situations where students express their considerations [1]. As an approach to peer evaluation in science education in Japan, there is a learning activity using a "mutual evaluation sheet" (hereinafter referred to as "the peer evaluation activity") [2]. In the peer evaluation activity, learners self-assess and mutual-assess their descriptions of the learning tasks in the class using the evaluation criteria set by the instructor, and based on the results of the score and comment evaluation, learners reflect on their descriptions of the learning tasks and rewrite their descriptions. This is a learning activity that aims to develop expressive skills. In particular, it has been pointed out that the motivation to work on learning increases by receiving positive comments from others,[3] and that learners improve their questions by commenting on each other's improvements in the process of creating questions related to the learning content. [4]. However, the accumulation of knowledge on writing instruction for comment evaluation is not sufficient. The purpose of this study is to clarify the effect of comment writing instruction in peer evaluation activities of a lower secondary school science class on the improvement of learners' descriptions.

2. Method

Learners of science classes in the lower secondary school discuss the results of their experiments and evaluate each other's scores and comments on their discussion descriptions. In this case, we set up an experimental group in which learners rewrite their discussion descriptions by referring to the comments they wrote after receiving comment writing instruction, and a control group in which learners rewrite their discussion descriptions by referring to the comments they wrote without receiving comment writing instruction. Then, we analyze evaluation scores and evaluation comments in peer evaluation activities of the experimental group and the control group, and examine the effect of the comment writing instruction on learning.

3. Classroom practice

3.1 Setting of the survey target group and class outline

There were conducted classes for 54 students in two classes of third-year students at a public lower secondary school who cooperated in this study. The experimental group consisted of 25 students who were asked to complete the comment evaluation with comment writing instruction, and then to reflect on the results of the evaluation and rewrite their discussion description. The control group consisted of



29 students who were asked to complete the comment evaluation without comment writing instruction, and reflect on the evaluation results and rewrite their discussion description. The content of this study was a development of "Acids, Alkalis, and Ions" and was about the color change of acids, and alkalis using anthocyanins contained in the extract of purple cabbage. The students were asked to explain the change in liquidity based on the results of an experiment in which lemon juice was added to yakisoba noodles containing the extract of purple cabbage, and were given a worksheet to write their thoughts. The class was conducted for three periods. The difference between the experimental group and the control group was the presence or absence of comment writing instruction in the second period.

3.2 Peer evaluation activities and comment writing guidance

Self- and mutual evaluation were conducted using the evaluation criteria (Figure 1) set by the instructor. The evaluation score was 1 point for each sub-item, and 0 points if the sub-item corresponded to a point reduction example, and the scores of the sub-items were totaled. Evaluation comments were also included. In the comment writing instruction, the contents that should be written in the following comments were presented and instructed.

In the first line, the author points out the good points and the points to be improved based on the discussion description.

In the second line, advice for improvement is given based on the points made in the first line. When giving advice, use the words "it is better to do" to encourage improvement and "it is even better to do" to encourage further improvement.

In the comments, "I think" and "I feel" should not be used because they are describing advice.

4. Results and Discussion

The results of the score evaluation and the analysis of the learners' comments were analyzed. Morphological analysis was conducted using ChaSen and R ver3.5.1 with KH Coder ver.2.00f, and statistical tests were conducted using SPSS ver22.

4.1 Analysis of score evaluation results

The discussion descriptions of the experimental and control groups were evaluated by two researchers according to the established evaluation criteria. The result showed that the scores of the experimental group were significantly higher than those of the control group in sub-items (1), (2), and (3) of the second re-written discussion description (Fisher's exact test, two-tailed test, $p < .05$). For this result, it was speculated that comments related to sub-items (1), (2), and (3) were written in the first peer evaluation activity of the experimental group.

4.2 Analysis of comment evaluation results

Morphological analysis of the comments was conducted to compare the characteristics of the comments of the experimental group and the control group at the first peer evaluation activity. Then, Jaccard Index was obtained as similarity coefficients of the co-occurring words. In addition, words that were instructed to be written during the comment writing instruction were excluded from the analysis. The results of the analysis showed that there was no significant difference in the number of occurrences of co-occurrence words in the self-evaluation comments, but there was a significant difference in the number of occurrences of co-occurrence words in the evaluation comments to others (Fisher's exact test, two-tailed test, $p < .05$) (Table 1). Therefore, it can be inferred that there is a difference in the characteristics of evaluation comments to others.

The words in classification 1-5 were related to sub-items (1), (2), and (3), and the number of learners who wrote these words in their comments was significantly higher in the experimental group. Hence, we inferred that the comments of the experimental group were characterized by the fact that they pointed out more about sub-items (1), (2), and (3) than those of the control group in the first comment evaluation for the first discussion description. This was one of the reasons why the scores of the experimental group on sub-items (1), (2), and (3) in response to the second discussion description were significantly higher than those of the control group. In other words, the learners in the experimental group made specific comments on sub-items (1), (2), and (3) in their evaluation comments to others in the first session, which caused the difference in scores in the second session. It was suggested that they were encouraged to improve their discussion description from the viewpoint of the sub-items they were pointed out in the peer evaluation activity when learners pointed out specific ways to improve their writing from the viewpoint of the sub-items of the evaluation criteria in the comment writing instruction for others. On the other hand, the number of learners in the control



group who wrote comments using words in classification 6 was significantly higher than that in the control group. It was considered to be a feature of the absence of comment writing instructions [3].

😊 Let's evaluate our description !!! 😊

Evaluation Items	Evaluation Sub-items	Examples of Point Deduction
Correct Content	(1) Describes the acidic color of anthocyanin, a pigment of purple cabbage.	❑ Points will be deducted if it is not correctly stated that anthocyanin, the pigment of purple cabbage, turns red when acidic.
	(2) Describes the color of anthocyanin, a pigment of purple cabbage, in alkaline conditions.	❑ Points will be deducted if it is not correctly stated that anthocyanin, the pigment of purple cabbage, turns blue in alkaline conditions.
	(3) Describes ions that are acidic and ions that are alkaline.	❑ Points will be deducted if it is not correctly stated that the ion indicating the acid property is a hydrogen ion and the ion indicating the alkaline property is a hydroxide ion.
	(4) Describes the relationship between the properties and ingredients of fried noodles.	❑ Points will be deducted if it is not correctly stated that brine, an ingredient in fried noodles, is alkaline.
	(5) Describes the properties of lemon juice and its relationship to its components.	❑ Points will be deducted if it is not correctly stated that citric acid, a component of lemon juice, is acidic.
	(6) Describes using the correct terminology.	❑ Points will be deducted if you do not correctly describe acidity, alkalinity, anthocyanin, neutralization, hydrogen ion, hydroxide ion, etc.
Appropriate Written Expression	(7) Regarding the descriptions of "experimental results," "claims," and "reasons," the subject and predicate correspond, and there are no typographical errors or omissions.	❑ Points will be deducted if the subject and predicate do not correspond, or if there are typos or omissions.
	(8) The amount of information in the text is appropriate and the text is written within the given frame.	❑ Points will be deducted if the experimental results, claims, and reasons are not written within 100 words each.
Logical Expression	(9) Appropriate representation of experimental results and facts.	❑ Points will be deducted if the change from blue to red is not properly expressed.
	(10) Expresses ideas appropriately.	❑ Points will be deducted if the yakisoba does not properly describe the acidic change.
	(11) Expresses ideas appropriately.	❑ Points will be deducted if it is not properly stated that anthocyanins show red color when acidic and that the hydroxide ions in the fried noodles were neutralized by the excess hydrogen ions in the lemon juice, resulting in acidity.
	(12) The description is not a mixture of thoughts and feelings.	❑ Points will be deducted if words such as "think", "feel", and "imagine" are included.

Fig 1. The evaluation criteria



Table 1. Comparison of words appearing in the first evaluation comments to others between the experimental group and the control group

Class.	Word A	Word B	Experimental Group n=66		Control Group n=80		J(A,B)
			Appearing	Not Appearing	Appearing	Not Appearing	
1	Anthocyanin	Write	21**	45	10	70	.317
	Anthocyanin	Not	16**	50	5	75	.258
	property	Write	17**	49	4	76	.256
	property	Not	11**	55	2	78	.193
	property	Anthocyanin	8*	58	2	78	.220
2	Ion	Write	34**	32	7	74	.398
	Ion	Not	21**	45	3	77	.292
	Ion	Acidic	13**	53	1	79	.236
	Ion	Alkaline	11**	55	1	79	.241
	Ion	Indicate	8**	58	0	80	.222
	Hydrogen ion	Hydroxide ion	5*	61	0	80	.556
3	Ion	Anthocyanin	14**	52	4	76	.230
4	Acidic	Alkaline	15**	51	4	76	.667
	Acidic	Write	18**	48	7	74	.263
	Acidic	Not	10**	56	1	79	.164
	Acidic	Indicate	7**	59	0	80	.375
	Alkaline	Write	16**	50	4	76	.235
	Alkaline	Not	10**	56	0	80	.167
	Alkaline	Indicate	7**	59	0	80	.391
	Alkaline	Be	5*	61	0	80	.143
5	Write	Not	30**	36	9	71	.326
	Write	Be	13**	53	4	76	.157
6	Understand	Easy	1	65	9**	71	.474

**p<.01 *p<.05

Appearing: Number of learners for whom word A and B appeared in the comment.

Not Appearing: Number of learners for whom word A and B did not appear in the comment.

J(A,B): Jaccard Index for words A and B in the group with significantly more learners in which words A and B appear in the comments.



5. Conclusions

We examined that the effect of comment writing instruction on the improvement of reflective writing in peer evaluation activities. The results revealed that comment-writing instruction promotes improvement of others' descriptions in terms of the sub-items of the evaluation criteria when learners evaluate others' comments, by pointing out specific areas for improvement in others' descriptions.

References

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