The Mathematics Communication Skill Reviewed from Self-Efficacy on Group Investigation Learning with Demonstration Feedback

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Article Info	Abstract
	This research aims to describe the mathematics communication skill of learners reviewed from self-efficacy on Group Investigation learning with demonstration feedback. This research used the mixed method with concurrent embedded design. The research population was from the seventh grade of Islam Sultan Agung JHS 4 Semarang 2019/2020. The subjects were two selected people of high, moderate, and low categories. The research collected the data with a mathematics communication test, self-efficacy questionnaire, and interview. The results showed the Group Investigation learning with demonstration feedback positively influenced the learners' mathematics communication skills. The other results described the learners' mathematics communication skills of each category: high, moderate, and low. They had various mathematics communication skill indicator mastery.

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INTRODUCTION

Mathematics is a vital science to foster mathematics, logic, and creative communications (Sumarmo et al, 2012). Broody, cited in Asikin & Junaedi (2013), argues that mathematics is a communication means to share ideas, accurately, and briefly. Tiffany et al (2017) explain that communication is a crucial factor for both indoor and outdoor mathematics learning processes.

Communication deals with problem solutions and clarification through proper understanding (Setiyani et al, 2020). In learning mathematics, mathematics communication refers to an idea and mathematics symbol demonstration via spoken, written, drawn, or diagram modes (Triana et al, 2019). Learners that study mathematics must have communication skill to use the mathematics symbols (Kaya, 2014). Lee (2015) explain that mathematics communication is a vital mean to allow learners demonstrate their mathematics thoughts and understanding. It has the purpose to facilitate learners in representing and clarifying their thoughts. It is also useful to discuss new ways of solving problems.

An individual must also have the skill to express ideas because it is important in an individual problem-solving success (Lunenburg, 2011). Self-efficacy is a reliable-affective learning attribute to consider the efforts to achieve mathematics education success (Mukuka et al, 2021). The self-efficacy theory firstly emerged in Bandura's social-cognitive structure explanation. It refers to individual behaviors based on skills and expected outcomes (Bakar et al, 2020). Bong & Skaalvik (Nugroho & Riyanto, 2019), explain that self-efficacy influences the chosen attitude of an individual. It has the function of the effort to encounter difficulties while achieving the objectives. Every learner has different job difficulty type assumptions based on their factual performance and the difficulty level (Sørlie et al, 2017). Higher self-efficacy leads to better performance and responsibility (Herawaty, 2016). An individual with a strong belief will have higher self-confidence to take an action.

The interview results with the teacher of the seventh-grader of Islamic Sultan Agung 4 JHS revealed problems dealing with the prerequisite materials. They were linear equations in one variable while communicating them. The learners still had difficulties communicating the materials both orally and in a written manner. This preliminary condition was similar to Rosyid (2018). He found a school with an average score of mathematics communication skill question test of 30.86 (out of the ideal maximum score, 86) from the high-reliability question test items. The root of the problems was the lack of proper teaching methods that involved learners to observe, investigate, create conjecture, and test the conjecture.

Learners also did not believe in themselves to find the solution to get the answers. Thus, they need innovations to support the communication skill in a mathematics lesson.

The cooperative learning model is a learning model that demands the learners' activeness. Thus, it allows inter-learner interaction processes. One of them is Group Investigation (GI). This model allows interpersonal dialogs or communication. It also pays attention to the social dimension of classroom learning that has the function of cooperative and creative places between teachers and learners to develop the learning process (Slavin, 2005). This model requires feedback supports to minimize and direct the learning.

Shute (2008) explains feedback as the communicated information for learners. It has the purpose to modify the thoughts or behaviors to improve during the learning. Thus, it could motivate learners to promote initial investigation and provide learning opportunities. It can exist because of the new mental relationship in a learning process (Basheer et al, 2017).

Irons (2007) mentions various types of feedback. One of them is demonstration feedback. Gardner, cited in Basheer et al (2017), argues that demonstration allows learners to develop their meaningful experience. Thus, they can develop their curiosity and improve the new experience. Demonstration facilitates the intellectual stimulus to trigger the learners' imagination so they can understand better (McCormick et al, 2018). The statement is relevant to the learners' achievements (Greber et al, 2001).

This research aims to examine the mathematics communication skill of GI learners with demonstration feedback and to describe their mathematics communication skills reviewed from the self-efficacy.

METHOD

This research is a mixed-method with concurrent embedded design. Creswell (2016) explains that concurrent embedded strategy has the primary method to direct the project of the secondary data. Thus, the data provide support for the research procedure.

The researcher researched at Islamic Sultan Agung Junior High School 4, Semarang, in the academic year of 2019/2020. The population of this research involved the seventh graders.

The researcher took the sample randomly. It resulted in the VII A4 learners as the experimental group and VII A3 learners as the control group. The researcher chose the subjects from each self-efficacy category: high, moderate, and low.

The quantitative data collection was done with test technique. The developed mathematics communication skill tests were four essay question items. The researcher created the items based on the mathematics communication skill indicators. The techniques of collecting qualitative data were the self-efficacy questionnaire, interview, documentation, and observation. The self-efficacy questionnaire had eight indicators with twenty questions. The quantitative data analysis of the research used normality, homogeneity, completion, independent t-test, and proposition difference test. The qualitative data analysis applied the procedure of Miles & Huberman (2007). It began with data reduction, data display, and conclusion.

RESULTS AND DISCUSSIONS

The researcher applied the quantitative study to find out the effectiveness of GI learning with demonstration feedback toward the learners' mathematics communication skills. The result showed the learners could reach the completion requirement of the learners' initial mathematics communication skills with the formula of $X + \frac{1}{4} S$ with X as the average and S as the standard deviation (Lestari & Yudhanegara, 2015). The minimum completion result of the learners' mathematics communication skill is 68 with X = 66,25 and SD = 10,82.

After conducting research and analyzing the data, the results showed that (1) the average accomplishment of the experimental group showed that tcount > ttable = 5,236 > 1,725, thus the H_0 is denied. It means the learners' mathematics communication skill for GI learning with demonstration feedback is higher than 67; (2) the result of the proposition test of the mathematics communication skill shows Zcount > Ztable = 2,066 > 1,65, thus, H_0 is denied. It means the learners' completion proportion taught by communication learning with demonstration feedback approach was higher than 75%, (3) the results of proportion test of mathematics communication thinking skill showed that tcount > ttable = 2,374 > 1,686, thus, h0 is denied. It means the learners' mathematics communication skill for GI learning with demonstration feedback is higher than those taught by discovery learning, and (4) the learners' completion proposition test shows Zcount > Ztable = 2,081 > 1,65, thus H_0 is denied. It means the learners' mathematics communication skill completion taught by GI with demonstration feedback, is higher than the proposition of those taught by discovery learning.

The results showed that GI with demonstration feedback was effective for the learners' mathematics communication skills. GI learning with demonstration feedback led to interpersonal dialog or communication. It also paid attention to the social affective dimension during the learning process. The active participation of the learners could improve their learning outcomes (Muhalizah, 2018).

Rahmawan (2015) and Tasyanti (2018) found the implementation of GI was effective based on the positive questionnaire responses, higher than 75%. Trisnawati (2019) found the significance to improve the learners' learning outcome and positive response toward GI learning. The demonstration feedback is a part of the process to maximize learning.

The users of demonstration feedback have the function to empower and direct the learning based on the objectives. Feedback is an important matter of effective learning (Osuala et al, 2018). Feedback is not an assessment or outcome evaluation (Anggraini, 2015; Morris & Chikwa, 2016). The main focus of demonstration feedback is to assist learners individually or in a group. Thus, they will understand the given problems so they are more active in learning

(Meyar et al., 2003). Ion et al (2019) explain that feedback could improve learners' learning. Thus, the role of GI learning with demonstration feedback influenced positively the learners.

The qualitative analysis showed more than 20 learners of the experimental group had 3 learners with the high-self-efficacy category, 13 learners with the moderate-self-efficacy category, and 4 learners with the low-self-efficacy category. Then, the researcher selected subjects of each category for further analysis of mathematics communication skills.

The researcher reviewed the skill from each self-efficacy category. The results were varied, such as (1) low mathematics communication skills on low-self-efficacy learners: Based on the indicators of mathematics communication skills, the low-self-efficacy learners could not achieve all indicators. Their average answers mostly did not reach the conclusion. It meant their answers were incomplete. (2) the sufficient level of the indicator completion on moderate-self-efficacy learners: Based on the indicators, the learners could achieve the first and second indicators properly. However, they could not maximally reach the third and fourth indicators. (3) the high-self-efficacy learners could solve the mathematics communication skill indicators. Based on the indicators, the high-self-efficacy learners could achieve all indicators excellently.

CONCLUSION

Based on the results and discussion, GI learning with demonstration feedback positively influenced the learners' mathematics communication skills. The learners had various mathematics communication skills based on their self-efficacy. The low-self-efficacy learners could not reach all indicators of mathematics communication skills. The moderate-self-efficacy learners could only reach two indicators. Then, the high-self-efficacy learners could achieve all indicators.

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