

The Impact of Integrating Emotional Intelligence in Cooperative Mathematics Learning on Students' Metacognitive Skill

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Abstract. This study investigates the effect of integrating emotional intelligence (also known as emotional quotient or EQ) into cooperative-based mathematics learning on students' metacognitive skills. The research population was all eleventh-grade students of SMA Negeri 9 Luwu in mathematics and science program, while the sample recruited was the class of C. The data collection tools used were a questionnaire of emotional intelligence and a test of students' metacognitive skills. The students filled the questionnaire before the implementation of the instructional approaches. Results showed that the integration of EQ into cooperative learning positively impacts students' metacognitive skills. More than 75% of students have a good skill in planning and evaluating, and at least quite a skillfulness in monitoring.

Keywords: metacognitive skills, cooperative learning, emotional intelligence

1. Introduction

In this era, problem-solving is one of the skills needed, especially in the working world. Because people are likely to encounter problems in their work or even in their daily life, individuals should master and have it. It helps us to assess the situation, analyze information, and devise a plan for it. It is one of the main reasons why all companies put this skill as one of the requirements when they open job vacancies. Thus, teaching, developing, and enhancing students' problem-solving skills since the early stage is highly recommended.

One of the cores of problem-solving skills is metacognitive skills. It manages and coordinates the other components of problem-solving [1]. This skill includes selecting the appropriate strategies to comprehend the objectives or goals; planning strategies to solve them; choosing strategies to execute the plan; monitoring the actions while carrying out the procedures; evaluating the result; revising or revoking strategies when necessary [2]. People will be confused whenever their plan did not work if they did not know how to devise or plan, monitor, and revise their actions and solution [1,3]. Furthermore, a study revealed that metacognitive skill is one of the predictors in students' learning performance, including mathematics, and it helps us gain control and solve more complex and challenging or non-routine problems [4,5,6,7].

Metacognitive skills have improved since early grade and will advance and reach its full development around the age of 12 [3,8,9]. However, a preliminary observation on SMA Negeri 9 Luwu revealed that students' metacognitive skill in mathematics is still low. Thus, a solution is necessary to tackle such problems.

Many students' metacognitive skills enhance with the help of their environment, including their peers and teachers [3]. Promoting the ability can be achieved through several means, including instructional practices [9]. Some of the recommended approaches to developing the skills are whole-class or small groups discussion [10]. Learning that includes these approaches (or even combine them) facilitates the students to learn from and with their peers.

One of the learnings, which includes a small group and whole-class discussion, is cooperative learning. It is one of the suitable approaches for many subjects in the school curriculum, including mathematics [11]. Students participating in this approach can acquire many skills, including metacognitive abilities [12]. Cooperative learning consists of six phases or steps. They are stating learning objectives and motivating students; presenting material, organizing students into their groups; guiding and facilitating them to study and do their task; evaluating knowledge by assessing group works and giving appreciation and reward for achievement and participation [13].

Some problems might arise in cooperative learning, such as a conflict between students during collaboration [14] or passiveness due to students' anxiety. These emotional impediments could hinder the process of problem-solving and students' performance in mathematics [15]. Therefore, another strategy is necessary to solve and avoid the problem, and integrating emotional quotient into the learning can be one of the solutions. The teachers begin to incorporate emotional intelligence in the third phase. They divided the students into groups based on emotional quotient (EQ), ranging from the high one to the low one.

Research on the implementation of cooperative learning, metacognitive skill, and emotional intelligence is already prevalent, even in Indonesia. One study addressing emotional quotient developed media of learning integrated with it [16], and one examined the impact of the integration of EQ into learning on students' attitude to mathematics [17]. Some also investigated the effect of some learning approaches, including cooperative learning and learning cell, on students' knowledge and skills based on their emotional quotient [18,19]. However, they compared students' skills and knowledge based on their emotional intelligence, rather than integrating it and making it as a basis to divide students into small groups. In the topic of metacognitive skills, several studies examining how contextual teaching enhances the abilities [20,21], and there was one that used realistic mathematics education [22]. Nonetheless, a study investigating the impact of the integration of emotional quotient to cooperative learning on metacognitive skills is scarce.

Based on the importance of metacognitive skills and the problems stated, we find it important and necessary to conduct a study investigating the effect of integrating emotional quotient into cooperative learning toward high school students' metacognitive skills.

2. Method

This study employed a quantitative approach to investigate the impact of integrating emotional intelligence into cooperative learning on students' metacognitive skills. The population observed in this study was all eleventh-grade students of SMA Negeri 9 Luwu in Mathematics and Science Program (MIA) during the academic year of 2019/2020. There are 68 students in the eleventh grade. Class C, with 22 students, was recruited through random sampling as the sample of the research.

The main instruments used were a test and a questionnaire. The former was administered to the students to collect data on metacognitive skills, while the latter was given to examine students' emotional intelligence. The data collections were conducted separately, with the questionnaire given before the implementation of the instructional approaches.

To examine students' metacognitive skills, a test in the form of an essay was employed. The indicators of the skills investigated were:

- 1 Students can write down the data, the unknown, the verbal statement, and the conditions of the problem given.
- 2 Students can choose the appropriate and precise strategies in problem-solving.
- 3 Students can choose and employ the procedures or steps in solving the problems.
- 4 Students can mention the reason behind the strategies which they used to solve the problem.
- 5 Students can solve the problem by combining and relating their previous knowledge with their current one.

6 Students can use a problem-solving strategy correctly, which is by writing down the conclusion words such as to conclude, to summarize, therefore, thus, etc.

After the assessment guide was complete, it was adjusted with the criteria of students' metacognitive skills and the criteria of the test scores. The criteria are as follows.

Table 1. Criteria of Test Score of Metacognitive Skills

| Score Intervals | Category |
|--------------------|----------|
| $80 < x \leq 100$ | High |
| $65 < x \leq 80$ | Average |
| $0 \leq x \leq 65$ | Low |

Annotation:

x : score of metacognitive skills test

Table 2. Criteria of Metacognitive Skills' Level

| Level of Metacognitive Skills | Activity of Metacognition |
|-------------------------------|--|
| High | The presence of good skills in planning, monitoring, and evaluating. |
| Average | Good skills in planning and evaluating, and pretty good skill in monitoring. |
| Low | A pretty good planning skill, but a low skill in monitoring and evaluating. |

For the data of students' emotional intelligence, we developed a questionnaire based on indicators that examined EQ aspects. The aspects discussed were identifying and recognizing emotions, managing emotions, self-motivation, identifying and recognizing others' feelings, and building relationships. The five aspects and indicators used to develop the emotional intelligence questionnaire are shown in the following Table 3.

Table 3. Aspects and Indicators of the Development of Emotional Intelligence Questionnaire

| Aspects | Indicators |
|---|--|
| 1. Identifying and recognizing their own emotions | 1.1 Recognizing and feel their own emotions 1.2 Understanding the cause of the feelings that arise 1.3 Recognizing the impact of feeling to own actions |
| 2. Managing emotions | 2.1 Being tolerant of frustration 2.2 Could express anger appropriately 2.3 Could control aggressive behavior that is destructive to self and others. 2.4 Have positive emotions about self and environments 2.5 Have the skill to deal with stress 2.6 Could reduce the feeling of loneliness and anxiety in society |

- | | |
|--------------------------------|---|
| 3. Self-Motivation | 3.1 Can do self-control 3.2 Being optimistic in dealing with problems 3.3 Can focus on work given |
| 4. Recognizing others' emotion | 4.1 Can accept others' perspectives, points of view, and opinions. 4.2 Empathize or aware of the attitude toward other people 4.3 Can listen to others |
| 5. Building Relationships | 5.1 Understand the importance of building relationships with other people 5.2 Can solve conflicts with others 5.3 Have the ability to communicate with other people 5.4 Have a friendly attitude or easy to get along with peers 5.5 Have concern for others 5.6 Can live in harmony 5.7 Being happy to share and cooperate 5.8 Being mature and tolerant. |
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6. Result and Discussion

After distributing the questionnaire, the teachers divided the students into several small groups based on students' emotional intelligence data. The teachers used this grouping in their cooperative learning. As for students' metacognitive skills, its results are as follows

Table 4. Students' Metacognitive Skills After The Implementation of Cooperative Learning Integrated with Emotional Intelligence

| Score Intervals of Metacognitive Skills | Frequency | Percentage | Category |
|---|-----------|------------|----------|
| 80<x≤100 | 6 | 27 | High |
| 65<x≤80 | 11 | 50 | Average |
| 0≤x≤65 | 5 | 23 | Low |

Table 4 shows that the integration of emotional intelligence into cooperative learning impacts students' metacognitive skills positively. Exactly half of the students' ability is in the average category after implementing the instructional approach. Also, six students have high metacognitive skills, while the rest have low skill in metacognition.

The study findings revealed that 77% of students have good skills in planning and evaluating, and at least quite a good ability in monitoring. This positive effect occurred due to the combination of emotional intelligence and cooperative learning. Some research reported that in collaborative problem-solving, sometimes students help each other to solve problems by generating ideas, planning strategies, monitoring, comparing, and assessing the plans and ideas expressed [14,23].

However, the same studies also reported that in one moment, a conflict between students hinders the metacognitive process. They said that social or peers interaction is one of the antecedents, where students did not consider their friends' perspectives and ideas. Conviction and social skills are essential, and in this case, the integration of emotional intelligence plays a vital role in tackling or preventing such

problems. Moreover, group cohesiveness also positively correlates with the EQ [24]. By assigning students with different emotional quotient levels into a small group, a member with a high level is expected to build a better relationship among the group members because they have a better skill in managing and controlling their own and others' emotions. In the integration of emotional quotient, the expectations are that students: (1) form synergy in their teamwork; (2) endure failures; (3) achieve common goals; (4) manage their emotions and those of others; and (5) build and keep good relationships [25,26,27]. Emotional intelligence could use the information about emotions to guides thinking and actions [28]. Therefore, combining emotional quotient and cooperative learning does not only prevent the drawback of the latter, but it also develops students' metacognitive skills.

In cooperative learning, the phases that play a vital role in promoting metacognitive skills are the fourth and the fifth phase. In the former, all group members learn to help each other in solving the task given through discussion and interaction [29,30]. By discussing and observing with their peers, they learn how to choose and use the appropriate strategy. During the small-group discussion, it is likely that there is doubt regarding their answers. This situation is when metacognition appears, which is the evaluation of strategies and solutions [31]. The assessment in cooperative learning produces a better solution due to students comparing their judgment and ideas. A similar situation also happens in the fifth phase, but the differences are the task presentation, and the discussion and interaction are among groups.

7. Conclusion

This study revealed that the integration of emotional quotient into cooperative learning positively affects students' metacognitive skills. More than half of the students have a good skill in planning and evaluating, and at least quite a skillfulness in monitoring.

This study only involves a small sample and at a particular grade. Therefore, one should consider a larger sample or examining the same approach but with different or across levels of education. Further research investigating the use of other teaching strategies or even learning media to develop students' metacognitive skills is also necessary. Besides, integrating other non-cognitive factors is also recommended. Finally, this research result could serve as a reference for the teachers to implement learning strategies, which objective is students' metacognitive skills.

8. References

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