

The Effect Of Realistic Mathematics Education On Elementary Students' Critical Thinking Skills

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Abstract. Critical thinking becomes the most important skill in facing challenges and solving problems in everyday life. However, several studies describe students' critical thinking skills as being low. This condition is revealed from several studies that have been carried out, both by international institutions and individual researchers. One effort that can be done is to apply a learning model that is thought to improve critical thinking skills, one of which is the Realistic Mathematics Education Learning Model. This research is in the form of a quasi-experimental study with a non-equivalent control group design. The population in this study were Majalengka Regency Elementary School students in the 2019/2020 school year with a sample of fourth-grade students at SDN Baturuyuk II Dawuan. Samples were taken as many as two classes, namely the experimental class the Realistic Mathematics Education Learning Model, and the control class that applied conventional learning. The results showed that increasing students' critical thinking skills that obtained learning using the Realistic Mathematics Education Learning Model was better than students who used conventional learning.

Keyword: realistic mathematics education, critical thinking skill

1. Introduction

The challenges faced in the 21st century make every learning in school must equip students to have all the learning skills needed, one of which is critical thinking skill [1][2][3]. To be able to work and have a career in the era of the global economic community, students must be taught as early as possible critical thinking skills [4][5]. Preparing students to be able to think critically is a major goal in many professionals in higher education, and is also the competency sought by most university graduates [6]. Therefore, many academics and studies have discussed the importance of critical thinking skills in the context of 21st century education and labor [7][8]. Critical thinking skills are consistently included in all the list of important things behind college and career readiness [9][10].

Mathematics as one of the sciences learned in school has an important role in human life [11]. Many human activities are carried out using mathematical concepts [12]. Mathematics has learning objectives, one of which is to provide students with the ability to think critically. In teaching mathematics in schools, Critical Thinking needs to be integrated and emphasized in the curriculum so students can learn the skills and apply them to improve their mathematical performance and abilities [13]. Critical thinking in learning mathematics is a cognitive process or mental action in an effort to obtain mathematical knowledge based on mathematical reasoning [14][15][16]. Critical thinking will make a person automatically able to solve simple to complex problems both in lessons and in everyday life [17][18]. Therefore, developing critical thinking skills must be the goal in learning mathematics [19][20]. Critical thinking skills can be developed through learning and assessment in the classroom



[21]. Critical thinking is the art of improving thinking skills in analyzing and evaluating specific problem solving [22]. Therefore, in carrying out meaningful mathematics learning, critical thinking skills cannot be separated from mathematics [23][24]. Elementary school teachers need to equip students' critical thinking skills. This is because an elementary student who only studies the material without being equipped with this ability will have difficulty when working on the activities of searching and analyzing information.

The importance of students' critical thinking makes this skill need to be learned as early as possible. This skill must be a concern for every teacher in carrying out mathematics learning, including in elementary schools. Every learning activity undertaken must be based on the aim of improving students' thinking skills. This is with the aim that students already have critical thinking skills since taking basic education. However, several study results reveal that elementary school students' thinking skills are still low and efforts are needed to improve them [25][26][27][28][29]. One effort that can be done is to apply a learning model that can facilitate students to develop critical thinking skills, one of which is Realistic Mathematics Education (RME).

In learning mathematics, activities must begin with an introduction to the situation [30]. The ease of learning mathematics can be experienced if the content and context of learning are related to students' daily activities [31]. One approach to learning mathematics that uses contextual problems as a starting point for learning mathematics is Realistic Mathematics Education (RME) [32][33]. RME is able to solve problems caused by traditional and abstract mathematics learning [34]. This is because RME views mathematics as a human activity connected to reality [35]. RME provides an opportunity for students to rediscover mathematical ideas and concepts with adult guidance through exploring various real-world situations and problems [36].

Several previous related studies have revealed the benefits of RME in mathematics learning. Studies have also revealed the relationship between critical thinking that results from the learning model or strategy. Lady, Utomo, & Chikita has tested the effect of RME on mathematical abilities and learning outcomes [37]. Nurhayati & Hartono also investigated differences in conceptual understanding of junior high school students involved in STAD type cooperative learning combined with RME and students enrolled in regular classes [38]. Taubah, Isnarto, & Rochmad conducted an analysis of students' critical thinking in terms of mathematical self-efficacy in means of ending learning with the realistic mathematics education approach [39]. Dhayanti, Johar, & Zubainur applied RME to high school students to improve critical and creative thinking skills [40]. The results of the previous research described earlier showed that RME can be applied effectively to predict students' cognitive achievement and thinking skills in mathematics

The significance of this research is the emphasis on learning mathematics in elementary schools which is very important to build interest and motivation to learn mathematics. Despite the fact that mathematics is often seen as an abstract science that is difficult for elementary school students to understand. Therefore, the use of RME in class can provide examples for students based on their daily activities that occur to help them solve students' problems and difficulties and as a result, improve their cognitive achievement. This study, thus, aims to investigate differences in the critical thinking abilities of students who learn with RME and those who are involved in conventional learning.

2. Methods

Quasi-experimental research method using a research design in the form of a pretest-posttest non-equivalent control group. Before getting treatment, given a pretest and after getting treatment given post-test. The treatment is Realistic Mathematics education learning in the experimental class and conventional learning in the control class. The population in this study were all elementary school students in Majalengka Regency with a sample of 4th-grade students at SDN Baturuyuk II Dawuan.

Data collection instruments used were tests. The test proposed is a test of critical thinking skills consisting of each of the 4 question descriptions given in the form of pretest and post-test.

3. Results

Quantitative data in this study were obtained through written tests in the form of description tests. The researcher pretested to obtain preliminary data as an illustration of the students' initial mathematical critical thinking abilities. The test given is in the form of 4-item description questions that have been tested for validity, reliability, distinguishing features, and level of difficulty. Descriptive analysis of students' mathematical critical thinking ability test data is presented in the following table 1.

Tabel 1. Descriptive statistics on the results of a Mathematical Critical Thinking Ability Test

Test	Class	Ideal Score	Score			
			\bar{x}	S	x_{min}	x_{maks}
Pretest	Experiment	16	4,606	0,321	2	7
	Control	16	4,617	1,477	1	7
Post-test	Experiment	16	10,818	2,508	5	15
	Control	16	9,794	1,553	6	14
N-Gain	Experiment	1	0,556	0,191	0,214	0,900
	Control	1	0,455	0,116	0,250	0,800

Based on the data presented in table 1, it can be seen that the average score of students' mathematical critical thinking abilities in the experimental class and the control class is different, where the average control class is higher than the average experimental class. On the post-test score, the average post-test score of the mathematical critical thinking ability of the experimental class students was higher than the control class students. Where the experimental class gained an average of 10.818 while the control class amounted to 9.794. In other words, judging from the average, descriptively the post-test score of the experimental class is better than the control class. On the N-gain data, the average N-gain score of the mathematical critical thinking ability of the experimental class students was 0.556, while the control class was 0.407. So, descriptively increasing mathematical critical thinking skills in experimental class students is better than the control class.

To see the effect of each treatment, namely Realistic Mathematics education and conventional learning, on critical thinking skills, an analysis of the differences in the increase in critical thinking skills was increased in the two groups of students through the Independent Sample T-Test. The N-gain data tested has been stated to be normally and homogeneously distributed through testing for normality and homogeneity. The results of the Independent Sample T-Test calculations for both classes are presented in table 2.

Tabel 2. Independent Sample T-Test calculation results

Data	t	Sig.	Conclusion
N-gain	2,624	0,011	There is a difference

From table 2, the results of the calculation of Independent Sample T-Test post-test data for two groups of samples. Known sig. of 0.031 less than $\alpha = 0.05$, there is a significant difference in the critical thinking skills of students who carry out Realistic Mathematics education learning with students who carry out conventional mathematics learning. From these results, it can be concluded that the critical thinking skills of students who carry out Realistic Mathematics education are better than students who carry out conventional learning.

Based on the results of data analysis, there are differences in the increase in the critical thinking skills of the experimental class students with the control class. The mean difference shows the ability to think critically the class carrying out RME learning is higher than the class carrying out conventional learning. In other words, the application of RME learning in mathematics learning has a positive effect because of the difference in the increase in mathematical critical thinking skills. As Sugiyono said, if the treatment group was better than the control group, the treatment given to the

treatment group had a positive effect. In addition, if there is a significant difference between the experimental group and the control group, the treatment given has a significant effect. Thus, the results of this analysis support the purpose of research that there is an effect of the application of Realistic Mathematic education to students' critical thinking abilities.

4. Conclusion

Based on the results of the research and discussion in this study, it was found that the increase in the ability to think critically mathematically implementing Realistic Mathematics education was higher than the class that carried out conventional learning. Thus it can be concluded that implementing Realistic Mathematics education has a significant effect on increasing students' critical thinking skills.

5. Acknowledgments

thank you to all the research team and others for completing this research

6. References

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