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Implementation of the PREMIER model based on river area to improve fourth-grade students' mathematical problem-solving ability

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ABSTRACT

The problem in this study is the low ability to solve mathematical problems in geometry materials (square, rectangle, and triangle). An effort to overcome this problem is to conduct learning using the PREMIER model, which combines Project Based Learning, Realistic Mathematics Education, and Course Review Horay. This research uses a qualitative approach with the type of Classroom Action Research (CAR), carried out with four meetings. The subject of the study was a grade IV student of a public elementary school in Banjarmasin City in the academic year of 2021/2022, with a total of 13 students. The data analysis used is qualitative and quantitative. The results of this study show that student activity has increased, which at meeting one only reached 38.5% until at meeting four, it increased to 92.3% with a very active category.

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INTRODUCTION

Mathematics is one of the fields of science that has a vital role in human life because the study of mathematics is relevant to everyday life. Mathematics needs to be delivered to students from elementary to a higher level to provide students with concepts and understanding and problem-solving skills in daily life and other fields. Almost all activities in life apply mathematical concepts and theories. It is in harmony with opinions (Setyowati & Mawardi, 2018). In mathematics learning, it is necessary, to begin with problems related to daily life so that with contextual learning, learners can find for themselves the mathematical concepts they learn. With contextual learning, students can not only understand existing concepts but are also able to process to obtain these concepts (Lotulung, 2018). In addition, the learning of mathematics is focused not only on acquiring knowledge but also on cultivating attitudes that can be applied to solving everyday problems and skills related to problem-solving. Mathematics learning should be done with fun activities to increase student learning activities (Kamid et al., 2022).

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Problem-solving ability is an important thing that students must have, especially in mathematics learning, because problem-solving provides excellent benefits to students in seeing the relevance between mathematics and other subjects, as well as in real life (Gurat, 2018; Mutmainnah et al., 2021). Students are said to be able to solve mathematical problems if they can understand, choose the right strategies, then apply them in problem-solving. In elementary schools, especially for schools that implement the 2013 Curriculum, learning is needed that can lead students to have a scientific attitude, such as students having the ability to identify and analyze problems until finally creating a work of cooperation in the group and getting satisfactory learning achievements. Getting satisfactory learning achievement is influenced by two kinds of factors: internal and external. Internal factors include intelligence and ways of learning, while external factors include the family environment, school, and community (Nurhasanah & Luritawaty, 2021).

Sundiata & Widana (2019) asserts that mathematical problems that refer to contextual problems can help students connect mathematical concepts that are still abstract with the real world of their lives so that students can experience firsthand the benefits of learning mathematics. In general, contextual problem-solving begins with mathematical modeling (Kolar and Hodnik, 2021). For example, mathematics learning given to students domiciled in Banjarmasin must be taught in the context of the environment and socio-culture of the Banjarmasin community.

Banjarmasin city is nicknamed the city of a thousand rivers. This nickname is based on the city being surrounded by large rivers, namely the Barito and Martapura rivers. Two large rivers appear as small tributaries that divide the territory of this city. Therefore, students in this city are certainly very familiar with the river's natural environment, both in terms of flora, fauna, physical environment, and socio-cultural nature (Syafari et al., 2022). The students of public elementary school in Banjarmasin City, used as test materials for educational materials, are primarily domiciled in the river area, so they are used to coexisting with the river environment.

Based on the results of observations and interviews conducted on January 8, 2022, with the homeroom teacher of grade IV in public elementary school in Banjarmasin stated that: (1) students do not master the mathematical concepts of geometry; (2) students have difficulty in doing problem-solving in geometry; (3) students still rely on teacher advice and guidance, so that when facing complex learning problems, students cannot solve them, but only rely on teacher guidance so that students participate less in learning; and (4) teachers rarely associate mathematics lessons with the student's environment, such as the classroom environment or school where learning is learned takes place, and also rarely carries out group work activities.

After the interview, the researcher pre-tested grade IV students of public elementary school in Banjarmasin City with circumference material and a flat building area; all 27 students who took the test received scores below the KBM (minimum learning completion) set at 70. This shows that many students still need to be able to perform geometry. The error in working on the pre-test questions by one of the students can be seen in questions 1, 2, 3, 4, and 5. In questions 1, 2, and 3, it is known that the circumference and area are known, and students are asked to calculate the length of one side of each flat wake that is asked in the question. Students need to be corrected in answering these questions. For the error in question number 1, he replied that the square side is four even though the question asks for the square side's length. This shows that the student needs to be more careful in understanding the problem. The error also occurred in work on question number 2. In question number 3, students also needed to be corrected in calculating one of the side lengths of the triangle. In question number 3, a picture of a triangle along with the length of the side is known, but students still need to be corrected in determining the length of the side that is yet to be known. The next question, namely questions number 4 and 5, this question contains a

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story problem with contextual questions such as, "A square-shaped garden with a size of 27 m x 27 m. Around the garden will be planted mango trees and the distance between the trees is three m. Count the many mango trees that can be planted?" after checking the results, it turned out that the results of the SA students' answers were wrong. Even in question number 4, what is asked is many trees; the password even answers in cm. Likewise, in question number 5, what is asked is the total cost. SA even answers in square units, which shows that the student has difficulty understanding the problem and finding a solution to the problem. Based on the analysis of the error of working on the pre-test questions, students have not understood the concept of geometry and mathematical problem-solving.

From the results of observations, the cause of the low achievement in learning mathematics for grade IV students of public elementary school in Banjarmasin City is that the learning presented is less exciting or one-way. Hence, students are less involved in learning; learning does not focus on mastering concepts, there is no variation in learning models, and the absence of learning can stimulate students to improve problem-solving skills. This problem, if addressed, will have a good impact on student learning activities in the learning process so that students have difficulty understanding the learning material. It also adversely affects students' skills in problem-solving learning and student learning achievement.

One way that can be done to improve activities, problem-solving skills, and achievement in learning mathematics is to apply the PREMIER model. This PREMIER model is taken from the acronym of the word learning model Project Based Learning, Realistic Mathematic Education, dan Course Review Horay. This research question is as follows. Can the PREMIER model improve the problem-solving abilities of primary school students in a river environment?

LITERATURE REVIEW

According to Mahendra (2017), the project-based learning model (PjBL) allows students to carry out scientific learning activities in the form of questions, observations, research or experiments, inference, and building relationships with others to acquire knowledge, collecting information or data. Research conducted by (Kristiyanto, 2020) shows that applying the Project Based Learning (PjBL) model effectively improves students' critical thinking skills and can improve achievement in learning mathematics in elementary schools.

Project Based Learning as a system learning model that involves students in the transfer of knowledge and skills through a process of discovery with a series of questions arranged in tasks or projects (Guo et al., 2020). Project-Based Learning is a learning model that innovative, which emphasizes contextual learning through complex activities. The focus of learning lies on the core concepts and principles of a discipline of study, involving students in problem-solving investigations and other meaningful task activities, giving students the opportunity to work autonomously to construct their own knowledge, and produce real products (Almulla, 2020).

Project-based learning is a learning model that provides opportunities for teachers to manage classroom learning by involving project work through learning project work, creativity and motivation of students will increase (Cruz dan Rivera, 2020). Project work can be seen as a form of contextual open-ended activity-based learning, and is part of the learning process that places a strong emphasis on problem solving as a collaborative effort carried out in the learning process at a certain period.

The Project Based Learning (PjBL) learning model will be combined with other models to make learning more enjoyable. Following the problems faced, a combination with the Realistic

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Mathematics Education (RME) model is carried out because this learning model focuses on actual problems (the real world of students) so that students can understand the learning. To support learning that makes students active, it is necessary to develop mathematical materials that focus on daily application (contextual) and are adapted to the student's intellectual level, as well as using assessment methods integrated into the learning process (Astuti, 2018). Research conducted by (Syafitri et al., 2021) shows that the RME learning model effectively solves mathematical problems in flat building materials for grade IV elementary school students.

Realistic Mathematics Education (RME). Starting to be developed since 1971, the Freudenthal Institute developed RME a theoretical approach to learning mathematics to combine views on what mathematics is, how students learn mathematics, and how mathematics should be taught. Freudenthal believes that students should not be seen as passive receivers of readymade mathematics. Education must direct students to use situations and opportunities to reinvent mathematics in their own way. Many questions can be raised from various situations (contexts), which are felt to be meaningful so that they become a source of learning. Many views of RME are determined by Freudenthal, two of which are mathematics must be connected to reality and mathematics as human activity. Based on this thought, RME has characteristics, among others, that in the learning process students must be given the opportunity to reinvent mathematics through teacher guidance (Gravemeijer, 1994), and that the reinvention of mathematical ideas and concepts must start from exploration of real-world situations and problems. At this time, RME received attention from various parties, both from teachers, students, parents, lecturers (teacher educators), and also the government. According to Freudenthal, RME concepts related to learning mathematics (Gravemeijer, 1994), are: a) Mathematization, meaning that science is no longer just a collection of experiences, science involves organizing experiences using mathematics which is called mathematizing. b) Mathematics as a Finished Product and Mathematics as an activity. Learning based on the notion that mathematics must be taught as a finished product or as a deductive system, results in the view that mathematics is useless, dry, because learning mathematics only contains activities to memorize axioms, definitions, theorems, and their application to questions.. c) Activities or Activities, Knowledge and skills obtained by way of discovery will be better understood and more durable in memory than knowledge or skills obtained passively. d) Re-invention or discovery, means that mathematics learning activities must be based on mathematical interpretation and analysis.

According to (Halidin & Ansar, 2020), the Model Course Review Horey (CRH) is an innovative learning method that emphasizes understanding the material taught by the instructor (teacher) by answering questions at the end of the lesson for review or relearning of subjects taught by the teacher. Therefore, with the Horey Course Review learning model, it is possible to overcome the weaknesses of the Realistic Mathematics Education model because it is challenging for teachers to motivate students to find different solutions or solve a problem.

According to Huda, (2013) the Course Review Horay (CRH) learning model is a learning model that can create a lively and fun class atmosphere because every student who can answer correctly is required to shout "hurray!!" or any other yell you like. This model seeks to test students' understanding in answering questions, where the answers to these questions are written on a card or box that has been equipped with a number. The student or group that gives the correct answer must immediately shout "hurray!" or sing the group's chants. This model also helps students to understand the concept well through group discussions.

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METHOD

This research uses a qualitative approach with a class action research method (CAR). The purpose of PTK is to improve and improve the quality of learning practices carried out by teachers. Help empower teachers to solve problems in learning in schools. This goal is achieved by taking various alternative actions to solve classroom learning problems. According to the outline, four stages are commonly passed, namely: (1) Planning, (2) implementation, (3) observation, and (4) reflection. The subjects of this study were grade IV students of public elementary school in Banjarmasin City, with a total of 13 people, consisting of 7 male students and six female students.

The research instruments used were tests, questionnaires, and observation sheets. Tests are used to measure student learning outcomes on the cognitive aspect. The test questions used have been tested for validity and reliability with validity test results > 0.30 and reliability is 0.90. The 20 questions used met the results of the content validity test which were calculated using SPSS. Questionnaires are used to measure learning outcomes on the affective aspect. The questionnaire contains 10 criteria that have been tested for construct validation by 3 experts in the field of elementary schools with a result of 90, which means that the instrument can be used without improvement. Observation sheets are used to measure student learning outcomes in psychomotor aspects and teacher activity. In the observation process, the researcher made direct observations using each of the 10 criteria on the observation sheet using a Likert scale. The observation sheet has been tested for validity by three learning experts with a test score of 88, which means it is very feasible to use.

Data analysis used is descriptive statistical analysis using a scoring technique based on a Likert scale. The data is then presented in the form of a frequency table and the percentage is calculated based on the maximum value. In order to make the data easier to understand interesting, then the data is presented in the form of percentage tables to compare with the previous cycle. The research cycle used in this study is 4 cycles. Furthermore, the data is equipped with descriptive paragraphs to make it easier for readers to understand the contents of the data clearly.

The research hypothesis is that a combination of project-based learning models, realistic mathematics education, and coursey review horay can improve the problem-solving abilities of elementary students in mathematics who live around rivers.

RESULTS

The result analysis of this study is a comparison of implementation results at meetings 1, 2, 3, and 4. The factors studied, namely teacher activity, student activity, problem-solving ability, and learning achievement. As for looking at the tendencies in each of the aspects studied, it can be seen in the following description:

Teacher Activities

The results of teacher activities from meeting 1 to meeting 4 can be seen in the Table 1.

Table 1. Comparison of Meeting Teacher Activity Scores 1- 4

Cycle	1	2	3	4
Value (%)	67	81	89	97

From these data, it can be seen that the scores obtained from each meeting have increased. From the meeting, one score obtained by the teacher was 67. Then the result increased at the second meeting to 81. Furthermore, at the meeting of 3, the score obtained by the teacher again increased

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to 89. Similarly, at the meeting of 4, the score obtained by the teacher increased again to 97. Based on table 1, data on the comparison of teacher activities from meeting 1 to meeting 4 was obtained.

Table 1 shows that the quality of learning carried out by teachers in each meeting shows an increasing trend. This can occur as a result of the reflection activities provided by the observer and the improvements made by the teacher based on the results of the reflection so that the teacher can carry out learning activities optimally, and there is a significant increase. Thus, reflection activities must be carried out in every learning if you want the learning carried out by the teacher to have good quality and even very good.

Student Activities

The results of the observation of the assessment of student activities at each meeting can be seen in the Table 2. Table 2 shows data on the comparison of student activities from meeting 1 to meeting 4. Table 2 shows the tendency to increase student activity in each meeting during the learning process. This significant increase turned out to be a result of an improvement in the quality of learning carried out by teachers. This means that improving the quality of learning by teachers impacts the quality and quantity of student activities.

Table 2. Comparison of Meeting Student Activity Scores 1-4

Meeting	Very Active		Active		Moderately Active		Less Active	
	F	%	F	%	F	%	F	%
1	0	0%	5	38,5%	6	46,2%	2	15,4%
2	2	15,4%	5	38,5%	5	38,5%	1	7,7%
3	4	30,8%	6	46,2%	3	23,1%	0	0%
4	6	46,2%	6	46,2%	1	7,7%	0	0%

Learning Achievements

Students learning achievements at each meeting can be seen in the Table 3. From these data, it can be seen that student learning achievement classically increases in each meeting. At the meeting of 1 cognitive aspect of the completed student there were 46.2% (6 students). In the aspect of complete student effective affix, there were 53.8% (7 students), and in the psychomotor aspect of completed students, there were 30.8% (4 students).

Table 3. Comparison of Meeting Learning Achievement Scores 1-4

Aspects	Meeting			
	1	2	3	4
Affective	53,8%	69,2%	84,6%	100%
Cognitive	46,2%	61,5%	76,9%	92,3%
Psychomotor	30,8%	69,2%	100%	100%

Then at meeting 2, learning achievements again increased, namely in the cognitive aspects of students, 61.5% (8 students). In the aspects of complete student effectiveness, there were 69.2% (9 students), and in the psychomotor aspects of completed students, there were 69.2% (9 students). The student's learning achievement at meeting two still has yet to reach the completion criteria that

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have been determined. However, three students' learning achievements at the meeting continued to increase. 76.9% of students completed the cognitive aspects of students (10 students), and in the affective aspects of completed students, there were 84.6% (11 students). In the psychomotor aspects of completed students, there were 100% (13 students). The affective and psychomotor aspects at the meeting of 3 have already reached the established indicator of success. Meanwhile, the cognitive aspects at this third meeting have yet to reach the indicator of the established success. Furthermore, student learning achievement increased again at meeting four on the cognitive aspects of students yy and completed there were as many as 92.3% (12 students), in the aspectsof student effectiveness that was completed there was 100% (13 students) and in the psychomotor aspects of students who were completed there were 100% (13 students).

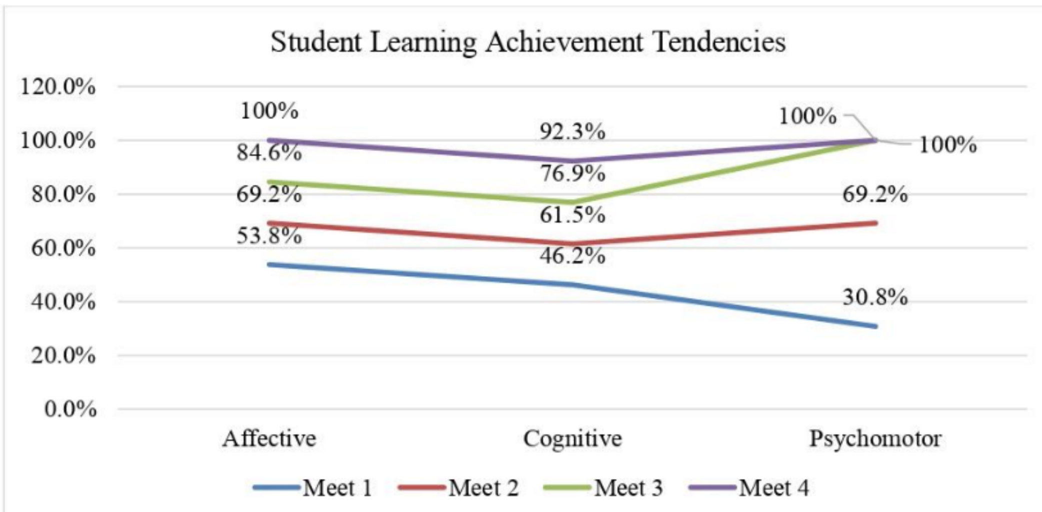

Figure 1. Graph of Student Learning Achievement Tendencies Meetings 1, 2, 3 and 4

As for knowing the tendency to increase significantly can also be seen from the picture of student learning achievement when the learning process is carried out during the fourth meetings. The tendency to increase can be seen as Figure 2. The graph in Figure 2 shows an increase in student development during the fourth meetings. Based on the presentation and analysis of data that has been carried out, the following is a comparison of the results of the implementation at the 1, 2, 3, and 4 meetings which include observations of teacher activities, student activities, problem-solving abilities, and student learning achievement (cognitive, affective, psychomotor) then there is a linear relationship. A comparison of tendencies is made in figure 2.

Based on figure 2, it can be seen that there is a relationship between teacher activity, student activity, and student learning achievement (cognitive, affective, psychomotor). If the teacher's activities are improving in the learning process, student activities and problem-solving abilities will also increase. Furthermore, the increase in teacher activity, student activity, and student problem-solving ability will increase student learning achievements.

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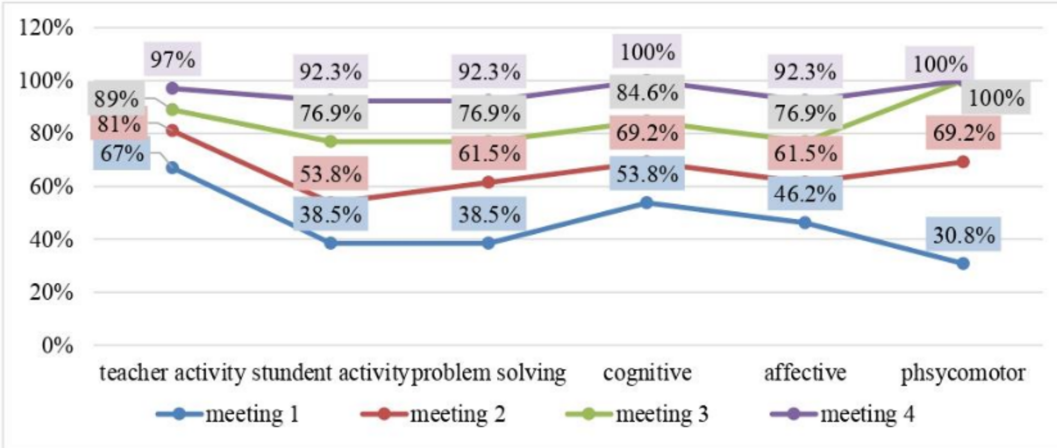

Figure 2. Graph of of Tendency to Improve All Aspects

Based on the results of the analysis carried out, it can be seen that the research hypothesis can be achieved. It is stated that process mathematics learning based on the river environment using the PREMIER model (*Project Based Learning, Realistic Mathematic Education, and Horay Course Review*) has proven to increase teacher activity and learning activities and proven to be able to increase the problem-solving ability.

DISCUSSION

The ability to solve problems in the implementation of learning using the PREMIER model (Project Based Learning, Realistic Mathematics Education, and Horay Course Review), the mathematical content of the circumference material, and the area of the flat building (square, rectangle, and triangle) each meeting always increases from meeting 1, meeting 2, meeting 3, and meeting 4. Based on the results of observations on the problem-solving ability of students classically at meeting 1 got a score of 38.5% with the criteria of being less skilled. The increase continued in each meeting until meeting 4 experienced a classical increase in the complete score of 92.3% with very skilled criteria.

Problem-solving ability is the ability to identify information related to a given problem and process it to provide a solution to the problem (Maulidya et al, 2019). This is in line with the opinion that explains that mathematical problem-solving ability is an effort by students to use their skills and knowledge to solve mathematical problems. For students to be better trained in solving problems, students need many opportunities to solve problems in mathematics and real-life contexts. This can be done by carrying out activities that are included in problem-solving activities. (Loc et al., 2020) (Davita & Pujiastuti, 2020)

Mathematics often adapts problem-solving skills using Polya models with steps (1) understanding problems; at this stage, students are expected to understand the problems presented by the teacher, namely by determining what the problem is and what is needed. (2) develop a plan. At this stage, students are expected to be able to determine the steps in solving the given problem (3) and carry out a plan. At this stage, the student begins to solve the problem according to the plan that has been prepared before (4) checking the problem-solving. At this stage, students are expected to be able to re-examine the solutions that have been worked out to minimize the occurrence of

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errors. (Riastini et al, 2021) Teacher activities that foster problem-solving skills are the teacher presenting the material using pictures of objects in the river environment, guiding students to understand the circumference and area of the flat building by utilizing surrounding objects, guiding students in exploring the material individually or in groups, and the teacher guiding (Bello & Rosario, 2020)the horray course review game.

The ability to understand a problem means an effort to correctly know a problem in order to be able to solve the problem by writing down what is known and what is asked in the form of appropriate mathematical sentences (Doorman et al., 2017. This ability can be increased due to the teacher's activity of presenting material by using pictures of objects in the river environment, guiding students to understand the circumference and area of flat buildings by utilizing surrounding objects. Learning that connects the subject matter with the context of daily life can give students much experience in interpreting problems and may also foster varied ideas in solving problems. This learning process will familiarize students with planning problem-solving activities, completing/doing calculations, monitoring the problem-solving process, and evaluating the results. (Zakiah et al., 2019)

The ability to develop a problem-solving plan means determining the right way or formula to solve the problem (problem). This ability can be increased due to the teacher's activity of guiding students to understand the circumference and area of flat building and guiding students when studying in groups to solve problems given by the teacher. Teachers who use learning to improve problem-solving skills must design student learning activities working in groups to solve problems given by the teacher in the form of real-world problems. Teachers must also guide students in finding problem-solving plans faced students.(Zakiah et al., 2019)

The ability to solve the problem means calculating the solution according to the plan already made. This ability can be increased due to the activity of the teacher giving tasks and guiding students to calculate the circumference or area of the flat wake. Of the two activities, the teacher provides various ways to solve problems so that students are free to choose how to solve problems. This is in line with the opinion that explains that carrying out the solution of the problem involves a thought process which is a cognitive activity to solve a problem by utilizing the knowledge that has been obtained, starting from understanding, and planning to solve so that when solving the problem in deciding the results of solving with different points of view and thinking.(Alifah & Aripin, 2018; Syafitri et al., 2020)

Concept understanding is a student's ability in the form of mastery of several subject matter, where students not only know or remember some concepts learned but can re-express in other forms that are easy to understand, provide data interplay, and apply concepts according to the cognitive structure they have. This ability can be increased due to the teacher's activity of guiding students to explore the material individually or in groups and carrying out quizzes by providing questions related to the cultivation of concepts to answer learning evaluations. The ability to re-check means re-examining the process and answers and concluding the questions that have been done to see the truth of the results that have been made.(Destiniar et al., 2019)

CONCLUSION

Based on the results of class action research conducted on grade IV-B students of public elementary school in Banjarmasin City on the mathematical content of the circumference material and the flat building area (square, rectangle, and pentatitga), it can be concluded that the activities of teachers, students, and the ability to solve mathematical problems of circumference material and flat building

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area (square, rectangle, and pentatitga) increase in each meeting. The results of this study can be used as information and reference material for further research. Especially those related to research to increase activity, problem solving skills, and student achievement. For other researchers who want to conduct research using this model, it is hoped that they can use learning media as supporting material in carrying out learning. I think this combination of models will be even better if combined with appropriate learning media according to the material being taught..

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