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The Effectiveness of Mathematics Learning with Contextual Approaches for The Topic of Straight Line Equation in Junior High School

M K Lutfi✉[1], M Darwis M.[2], H Syam[3], S Prabawanto[4]

[1,4] Departemen Pendidikan Matematika, Universitas Pendidikan Indonesia, Bandung, Indonesia
[2] Departemen Pendidikan Matematika, Universitas Negeri Makassar, Makassar, Indonesia
[3] Departemen Pendidikan Matematika, Universitas Muhammadiyah Makassar, Makassar, Indonesia
✉ khaedir.mkl@upi.edu

Abstract. This research is experimental research involving two classes, namely experimental class and control class which was given different treatment. Purpose of this research is to know (1) the implementation of mathematics learning in grade VIII at Junior High School in Makassar taught with contextual approach, (2) the effectiveness of mathematics learning of students taught with contextual approach, (3) comparison of effectiveness between contextual approach and conventional approach in mathematics learning for VIII grade students at junior high school in Makassar for straight line equation topic. Subject of this research is students in grade VIII in one of junior high school in Makassar. The sample of this study was taken from two classes using cluster random sampling. Data in this research was collected by using written test (essay) for straight line equation topic. Data analysis technique used descriptive statistics and inferential statistics. The results obtained from the descriptive statistical analysis was as follows: (1) the implementation of learning with contextual approach was well implemented with average 3.86 (2) the application of contextual approach is effective in terms of aspects: (a) average of students' post-test score taught with a contextual approach is 80.62, and students who completed minimum mastery criterion (KKM) is 76.92% ≥75% (fulfill classical completeness); (b) average of students' learning activities is 3.53 (very good category); and (c) average of student responses to learning is 3.59 (positive categories). (3) the implementation of learning with conventional approach for topic of straight line equation was implemented well with average 3.83. (4) the application of the conventional approach in terms of aspects: (a) average of students' post-test score taught with a conventional approach is 68.08, and students who completed minimum mastery criterion (KKM) is 52% ≤75% (do not fulfill classical completeness); (b) average of students' learning activities is 3.47 (good category); and (c) average of student responses to learning is 3.4 (rather positive category). (5) Based on inferential statistical analysis, the result was obtained $t_{count} > t_{table}$ (2.532 > 1.68) so that H_0 was rejected. Therefore, it can be concluded that learning mathematics in the topic of straight line equation for VIII grade students in junior high school in Makassar taught with contextual approach is more effective than taught with conventional approach.

Keywords: Contextual Approach, Conventional Approach, Straight Line Equation

INTORDUCTION ~ Concepts in mathematics have a relationship between one concept and another, starting from the simplest concept to the most complex concept. Therefore, mathematics is hierarchical, structured, logical, and systematic (Suwangsih & Tiurlina, 2010) Mathematics learning is currently still dominated by teaching that uses conventional approach. In this study, the teacher's role is very dominant in presenting the material. For example the teacher only uses the guide in the textbook so students do not actively participate in learning so that it needs discussion and collaboration in class (Goos, 2004). Usually after presenting the material, the teacher asks several students who are able to answer questions on the board related to the material just

explained. Students who are able to answer well will be more motivated, but for students who are not able to answer the problem will get negative treatment from both the teacher and his fellow friends. Learning with conventional approach generally places learning activities that are teacher-centered, while students tend to passively accept formulas without contribution in the learning process. In addition, mathematics subject matter in schools will be abstract due to the lack of material applied in students' daily lives, this causes students to only remember or memorize what they have learned. Students will experience difficulties in learning mathematics and can influence their daily lives and future careers (Clements & Sarama, 2011).

Mathematics as one of the basic sciences that in the learning process requires special skills that can help students to focus their attention fully on one particular topic. Complaints in learning mathematics that are widely heard in the world of education are the lack of links between mathematics learning in school and the conditions of students' daily lives. This causes the emergence of various adverse effects for students, namely decreasing student learning outcomes, so in the learning process for a teacher must require special skills that can lead students to focus their attention fully on their learning.

Target-oriented learning only masters material success remembering the short term, but students fail to solve problems in the long run. From the results of observations at SMP Negeri 26 Makassar, information was obtained that in general mathematics learning implemented by teachers in the classroom was by using a conventional approach. This results in a lack of student participation in the learning process. While the KKM for mathematics in the school is 70.

In the process of learning mathematics, a new learning approach is needed that further empowers students. A learning approach that does not require students to memorize facts but encourages students to construct knowledge in their own minds. One approach that is suitable to be used is the contextual approach.

Contextual Teaching and Learning is an approach based on cognition (Cobb & Bowers, 1999; Kumar & Voldrich, 1994) which is closely related to constructivist processes such as critical thinking, inquiry learning, and problem solving that are relevant to intellectual, and social contexts (Brown, 2000; Cavallo, Miller, & Saunders, 2002; Downing & Gifford, 1996; Driver, Asoko, Leach, Scott, & Mortimer, 1994)

Mathematics learning with a contextual approach is carried out by linking the material students are learning with students' daily lives. Learning like this is able to lead students to respond to each problem well. This is because in daily life, students are familiar with the problem. With this concept learning outcomes are expected to be more meaningful for students. This is in accordance with

Buchori's opinion (Trianto, 2009), that good education is education that not only prepares students for a profession or position, but to solve the problems they face in everyday life.

Various learning efforts are carried out with the aim that learning outcomes can be optimized. So that the endeavored learning can be carried out regularly, structured, and systematic. The way of teaching taken by the teacher is very supportive of the success of the learning process, so that the teacher should convey the material can direct students to focus on one particular topic. Thus the learning process is more effective and efficient.

As is known that in the conventional approach is only oriented to the target mastery of the material. The conventional approach sees knowledge as a set of facts that must be memorized. Based on the mastery of the material, memorization proved successful in short-term learning competencies, but failed to equip students to solve problems in the long run. In addition, the conventional approach still focuses on the teacher as the main source of knowledge. For this reason, a learning approach is needed that empowers students more and does not require students to memorize facts, and can encourage students to construct knowledge in their own minds. One learning approach that can be used is a contextual approach.

Contextual approach (Contextual Teaching and Learning) is an approach that links subject matter to real world situations (real world problems), and aims to encourage students to look for the relationship between knowledge and its application in everyday life (Glynn & Winter, 2004). It is hoped that through this learning method the concepts taught are more meaningful for students. So students will get used to solving problems in learning mathematics (Sears, 2003).

Komalasari argues that the contextual approach is a concept of learning that helps teachers link material taught with real-world situations of students and encourage students to make connections between the knowledge they have and their application in their lives as family members, citizens and workers (Komalasari, 2011).

This learning is used to understand the meaning of subject matter that students learn by linking the material in the context of their daily lives (personal, social, and cultural context). So students have knowledge / skills that can be flexibly applied (transferred) from one problem / context to another problem / context.

The Directorate General of Primary and Secondary Education) (Komalasari, 2011) mentions seven main components of the contextual approach, namely: Constructivism

Constructivism is the basis of contextual approach thinking that emphasizes that

learning is not merely memorizing, but students construct knowledge in their own minds. In the learning process, students build their own knowledge through active involvement in the learning and teaching process. Students become the center of activities, not teachers.

Inquiry

Inquiry is a core part of contextual learning activities. In learning, students are expected to be actively involved, so that intellectual skills, ability to solve problems and ways of thinking critically students can be developed (Richards & Laboratories, 1962). Therefore, teachers must always design activities that refer to discovering activities, so that the knowledge and skills acquired students are expected not to remember results, but to find results themselves.

Questioning

Questioning is the main contextual learning strategy. Asking questions in learning is seen as an activity of the teacher to encourage, guide, and assess students' thinking abilities. For students, the questioning activity is an important part in carrying out inquiry-based learning, which is digging information, confirming what is already known, and directing attention to aspects that are not yet known.

Learning Community

The concept of learning community suggests that learning outcomes are obtained from collaboration with others. Learning outcomes are obtained from sharing between friends, between groups, and between those who know and those who don't know.

In contextual classrooms, teachers are advised to always carry out learning in groups whose members are heterogeneous, provide information needed by their interlocutors and at the same time also request information needed from their study partners. Learning communities can be realized through: (a) forming small groups, (b) forming large groups, (c) working with equal classes, (d) working groups with classes above, (e) working with communities.

Modeling

In learning there is always a model that can be replicated. The model can be a way to operate something or the teacher gives an example to students how to do something before students carry out tasks and construct knowledge in their own minds. In a contextual approach, the teacher is not the only model. Models can be designed by involving students, or by bringing in models from outside that are presented in class.

Reflection (Refllection)

Reflection is a way of thinking about what you have just learned or thinking back about what you have done in the past. Reflection is a response to events, activities or knowledge that has just been received.

At the end of the lesson, the teacher leaves a moment for students to reflect. The realization is in the form of: (a) a direct statement about what he got on that day, (b) notes or journals in student books, (c) students' impressions and suggestions regarding today's learning, (d) discussion, (e) work .

Authentic assessment

Authentic assessment is the process of gathering various data that can provide an overview of the development of student learning. The description of student learning progress needs to be known by the teacher so that it can be ensured that students experience the learning process appropriately. Based on these data the teacher can identify the problem being faced by students, so with this information the teacher can take appropriate actions to anticipate the problem.

METHOD

This type of research is a type of quasi-experimental research. In this study involving 2 classes, namely one class as an experimental class (experimental) and one class as a control class (comparison). The experimental class is taught using a contextual approach while the control class is taught using a conventional approach.

The research variables in this study are the implementation of learning, learning outcomes, student activities, and student responses using the Pretest-Posttest Control Group Design. In this design, there are two classes chosen by cluster random sampling. The first class is called the experimental class, and the second class is called the control class. The population in this study were all eighth grade students of SMP Negeri 26 Makassar consisting of 9 classes. The sampling technique in this study uses "Cluster Random Sampling" which is chosen two classes randomly with the assumption that each class has the same characteristics. The implementation procedure in this study begins with (1) conducting initial observations at the school location of the study. (2) Assigning each class as a research sample into two classes, namely the experimental class and the control class. (3) Making observations in the experimental class and the control class. (4) Give a pretest to each class with the same level of difficulty. (5) Conduct learning activities with the same frequency and material in each class. At the end of the lesson, posttests were given to each class, with the same level of difficulty. (6) Analyzing data on learning outcomes that have been collected.

The research instruments used were (1) learning achievement tests to measure student mathematics learning outcomes. (2) The observation sheet of student activities is arranged to find out the activeness of students in class during the learning process. (3) The observation sheet of the implementation of learning is compiled to find out the implementation of each learning phase based on the lesson plan implemented by the teacher during the learning process. (4)

Questionnaire student responses to determine student responses to the learning approach applied by the teacher.

Data analysis

Descriptive statistical analysis which is intended to analyze the implementation of learning, student learning outcomes, student activity data, and student responses. As for comparing the effectiveness of the application of the learning approach in this study, it is necessary to make criteria based on the effectiveness criteria for applying the learning approach. The application of an approach A is said to be more effective than approach B if at least two of the three indicators of effectiveness in model A are better than model B. Requires student learning outcomes as an absolute requirement in comparing the effectiveness of the two learning approaches and the implementation of learning as a prerequisite for effectiveness.

Inferential Statistics Analysis

Inferential statistical analysis is intended to test the research hypothesis. Inferential statistical analysis aims to make generalizations which include estimation (estimation) and hypothesis testing based on data. Because the assumptions of normality and homogeneity of variance are met, testing the hypothesis is done by t-test.

RESULT

Descriptive Statistics Analysis

The recapitulation of the score of observations of the implementation of learning during the four meetings in detail can be seen in the following table:

Tabel 1. The results of observations of the implementation of learning

	Meeting	Average score	Criteria
Experiment Class	I	3,38	Quite Done
	II	3,61	Well done
	III	3,77	Well done
	IV	3,83	Well done
	Average	3,65	Well done
Control Class	I	3,25	Quite Done
	II	3,58	Well done
	III	3,75	Well done
	IV	3,82	Well done
	Average	3,60	Well done

There are causes that influence the imperfectness of the implementation of learning through a contextual approach is the teacher's limited ability to apply these

treatments to the experimental class, so that it requires more time and the frequency of applying higher treatments to improve the implementation of learning. Based on data obtained from observations of the implementation of learning through a contextual approach are the steps of learning that are less implemented in the class is the difficulty of maximizing students to construct their knowledge and relate it to their daily lives.

While the implementation of learning through conventional approaches is influenced by the limited ability of teachers to guide each student, because students tend to be passive. Based on data obtained from observations of the implementation of learning through conventional approaches it is known that the steps of learning that are not implemented in the class are difficult to control all students learning individually, besides the teacher is difficult to guide each student to work on worksheets.

Student learning outcomes

Statistical results related to student learning outcomes in the experimental and control classes are presented in the following table.2:

Table 2. Description of Student Pretest Scores in Experimental Classes

		Satitistic Value of Experiment Class		Satitistic Value of Control Class	
		Pretest	Postest	Pretest	Postest
Statistics	Sample Size	26	26	25	25
	The lowest score	6	57	3	33
	The highest score	26	100	8	93
	Average	7,23	80,62	5,76	68,08
	Standard Deviation	3,871	14,988	1,012	16,523
	Variance	14,985	224,646	1,023	272,993
	Range	20	43	5	60

Student activities taught through the Contextual Approach

Student activity data obtained through the observation of student activity conducted during the learning process takes place. Indicators of student activity consists of seven aspects of observation based on the characteristics of learning. Observation was carried out based on the instructions on the observation instrument that was carried out at each meeting based on the assessment rubric. Data observers observations are presented in the following table:

Table 3. Description of the average value of student activity in the learning process in the experimental class

Aspect	Average of Student Activity	Category
The presence of students during the learning process.	3,9	Very good
Pay attention to the information conveyed by the teacher	3,8	Very good
Asking questions about material that is not yet understood.	3,4	Good
Answering questions / questions raised by the teacher.	3,6	Very good
Ask for guidance / assistance in working on LKS training questions.	3,3	Good
Active in discussing subject matter with other students.	3,4	Good
Students who are able to work on problems correctly on the board.	3,6	Very good
Conduct other activities outside of learning activities (do not pay attention to the teacher's explanation, sleepy, sleep, disturbing friends, in and out of the room).	3,5	Very good

The average score of student activity for each meeting in the class that is taught through a contextual approach can be seen in the following table:

Table 4. Description of the final average value of student activity in the learning process

Meeting	Average of Student Activities	Category
I	3,1	Good
II	3,5	Very good

III	3,6	Very good
IV	3,8	Very good
Average	3,5	Very good

The aspect of the activity is said to be fulfilled if the activity score is minimal in either category. Based on the above table, it appears that the activity category is in the very good category reaching an average of 3.5. Thus it can be concluded that the activities of students in the class being taught through a contextual approach to the material in a straight line equation meet the effectiveness criteria.

Student Activities taught through the Conventional Approach

Student activity data obtained through the observation of student activity conducted during the learning process takes place. Indicators of student activity consists of seven aspects of observation based on the characteristics of learning. Observation was carried out based on the instructions on the observation instrument that was carried out at each meeting based on the assessment rubric. Data observers observations are presented in the following table:

Table 5. Description of the average value of student activity in the learning process in the control class

Aspect	Average of Student Activity	Category
The presence of students during the learning process.	3,7	Very good
Pay attention to the information conveyed by the teacher	3,6	Very good
Asking questions about material that is not yet understood.	3,5	Very good
Answering questions / questions raised by the teacher.	3,4	Good
Ask for guidance / assistance in working on LKS training questions.	3,3	Good
Conduct other activities outside of learning activities (do not pay attention to the teacher's explanation, sleepy, sleep, disturbing friends, in and out of the room).	3,5	Very good
Take notes and make a summary of the subject matter conveyed by the teacher.	3,5	Very good

The average score of student activity for each meeting in the class taught through conventional approaches can be seen in the following table:

Table 6. Description of the average value of student activity in the learning process

Meeting	Average of Student Activities	Category
I	3,3	Good
II	3,4	Good
III	3,6	Very good
IV	3,7	Very good
Average	3,5	Very good

Table 6. becomes the fact that the average value of student activity in the learning process at the first meeting is 3.3, the second meeting is 3.4, the third meeting is 3.6, and the fourth meeting is 3.7. The average value of student activity for the four meetings was 3.5.

Based on the above table, it appears that the activity category is in the very good category reaching an average of 3.5. Thus it can be concluded that the activities of students in the class taught through conventional approaches to the material in a straight line equation meet the effectiveness criteria.

Student Responses to Learning

The results of the research student responses can be seen in the table below:

Table 7. Category aspects of student responses in the experimental class

	Average score	Category
Experiment Class	3,57	Positive
Control class	3,46	Positive

The results of the study above indicate that the average value of student responses obtained from the seven aspects in question was 3.57. Based on the table above, it can be concluded that the students' response to the class being taught through a contextual approach to the material in a straight line equation is "positive". Thus descriptively meet the effectiveness criteria. While the results of student responses can be seen in the control class shows that the average value of student responses obtained from the five aspects in question is 3.46. So it can be concluded that the response of students in the class taught through conventional approaches to the material straight line equation is "positive". Thus descriptively meet the effectiveness criteria.

Inferential Statistics Analysis

Normality test

Calculation results obtained for the difference between the pretest and posttest in the experimental class obtained p-value> a that is 0.200> a (significance level a = 0.05). Furthermore, the calculation results obtained between the

pretest and posttest control class obtained p-value> a is 0.144> a (significance level a = 0.05). The test criteria are normally distributed data if p-value> a. So it can be concluded that the results of calculations in the experimental class and the control class are in the normal category.

Homogeneity Test

The calculation results obtained between the experimental class and the control class are p-value> a namely 0.964> 0.05. The test criteria are that the two variants are the same if the p-value> a. So it can be concluded that the results of calculations between the experimental class and the control class have the same variant. Next we will test the hypothesis statistics by analyzing the initial value and the posttest value. The analysis results obtained the calculated T value between the experimental class and the control class is 2.532. By using a 95% confidence level, a = 5%, with df = 49, the T table results obtained are 1.68. Because T arithmetic> T table (2,532> 1.68) then H0 is rejected. This means that learning mathematics through contextual approaches is more effective than through conventional approaches.

DISCUSSION

Based on the results of initial observations that the implementation of learning activities is still centered on or dominated by the teacher, both in the experimental and control classes. Before conducting the research, the teacher still explained in detail the material being taught, such as giving formulas and sample questions in detail. Examples of these problems are mostly done by the teacher himself and students only imitate the way the solution has been done by the teacher. Student involvement tends to be less visible in learning activities. This causes some students who look enthusiastic to follow the lesson, even most students look bored following the mathematics learning process.

Based on the observations of researchers at the time of the experiment, students become more interested in following the teaching and learning process after being given problems or problems from daily life. Students are more active in constructing answers. They try to find solutions to each problem through interactions between students and students and the teacher. Thus, the role of the teacher is not too dominant. The teacher acts as a facilitator and motivator in the teaching and learning process.

In students who are taught with conventional approaches, student involvement in the teaching and learning process is less visible. The teacher's role is very dominant because it must explain the material thoroughly. This causes only a few students who are seen to be active in learning. When the teacher gives the opportunity to ask questions, only a few students look enthusiastic. Most students just sit listening to the teacher lecture and copy the explanations given by the teacher. Likewise, when the teacher gives

exercises, only a few students are seen actively working on the questions. Students have a tendency to wait for answers from the teacher. Therefore, the contextual approach is very helpful for students in making it easier to understand the lesson quickly and is more beneficial because it is related to their daily lives.

CONCLUSION

Descriptive research results indicate that mathematics learning for VIII grade students of SMP Negeri 26 Makassar on the subject of Straight Line Equations taught by using contextual approaches is considered effective to be applied. This can be seen from the average posttest score of 80.62 with a standard deviation of 14.988 of the ideal score that might be achieved ie from 100 being at an interval of 65-84. When compared with the average pretest score of students in the experimental class of 7.23, it appears that student learning outcomes have improved after being taught with contextual learning.

The results of mathematics learning for eighth grade students of SMP Negeri 26 Makassar on the subject of Straight Line Equations taught by conventional approaches are categorized as medium. This can be seen from the average posttest score of 68.08 with a standard deviation of 16.523 from the ideal score that might be achieved ie from 100 being in the 55-64 interval. When compared with the average pretest of students in the control class of 5.76, it appears that student learning outcomes have increased.

This shows that the contextual approach is more effectively applied than the conventional approach based on categorizing the average value in the experimental class which is in the high category when compared to the increase in the average value in the control class that is only in the moderate category.

The results of inferential analysis showed that before being given treatment, there were no differences in students' mathematics learning in the experimental class and students in the control class. This is indicated by the results of the initial value analysis where Tcount> Ttable is 2.532 <1.68. After being given treatment, there is a difference in the mathematics learning of students who are taught with a contextual approach with students who are taught with a conventional approach where the average value of students taught using a contextual approach is higher than the average value of students taught by conventional approaches.

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