

THE INFLUENCE OF SCIENTIFIC APPROACH WITH CROSS LINE METHOD FOR MULTIPLICATION TOWARD STUDENT UNDERSTANDING ON THE CONCEPT OF MULTIPLICATION

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Abstract: This study aims at determining the influence of scientific approach with cross line method for multiplication toward student understanding on the concept of multiplication. The type of study is a one-group experiment. The population of the study in the third-grade as much 80 students of the elementary school in Bandung. The sample of the study as much 38 children. The sampling technique was done by purposive sampling. The technique of collecting data using pre-test and post-test. The pre-test and post-test using 5 indicators understanding on the concept of multiplication. Data were analyzed using descriptive statistic. The results show that mean the pre-test 28 and mean the post-test 69. Also, 4 indicators understanding concept multiplication increased. Thus it can be concluded that the scientific approach with cross line method for multiplication proved to improving student understanding on the concept of multiplication.

Keywords: scientific approach, cross line method for multiplication, understanding on the concept of multiplication

1. Introduction

The era of educational education today is known as 21st century education where it emphasizes skills. The three skills concepts of the 21st century are (1) life and career skills, (2) learning and innovation skills, and (3) information media and technology skills. Based on this the curriculum was developed to meet the needs of the 21st century by developing the curriculum 2013. Curriculum 2013 or K13 is famous for scientific approach and by using the steps that are structured and systematic. curriculum 2013 also emphasizes the mastery of hard skills and soft skills.

There are 2 skills that must be possessed by students that are hard skill and soft skill. Hard Skill is a mastery of science, technology, and skills related to the field of knowledge, this hard skill is derived from competence and basic level. While soft skill is a personal skill in dealing with others (interpersonal skills) and inner skills (intrapersonal skills) that are able to develop optimally. Hard skill and soft skill are needed by students mastery of various learning one of them on learning mathematics⁶. One of the abilities in Hard skill is mathematical understanding where mathematical understanding term which is a very important mathematical skill and must be possessed by students in learning mathematics. The mathematical competence required in the present era is the mastery of mathematical skills, one of which includes the understanding of the concept for obtaining teaching and learning activities is no longer focused on the role of the teacher as the transfer of knowledge, but must make the student the center of treatment and attention¹¹.

One of the understanding concept mathematical must have student is understanding concept multiplication because multiplication is the basis for students to learn advanced materials in mathematics such as LCM (Least Common Multiple) and GCD (Greatest Common Divisor), looking for circumference and area plane and solid and much more material using multiplication. In principle, multiplication is a structured pattern and the prerequisite that must be possessed by students before studying multiplication is the rule of addition. Multiplication is a topic that is difficult to understand by students and can be seen that many students in elementary schools who have not mastering multiplication, especially when multiplication dozens with units and dozens with dozens of visible students are difficult to do the problem.

Most students do multiplication operations in proportion or stacking down while the demands of the 21st century require students to think innovatively. Resolve for problem the researchers interested to use method cross line multiplication because this method make student easy to use by using lines that are connected to form the point that represents multiplication so that the teaching becomes more concrete than using the way of stacking down. Combine method cross line multiplication with scientific approach make learning structured and systematic. Therefore, the researcher chose the title: The Influence Scientific Approach With Method Cross Line Multiplication Toward Ability Understanding Concept Multiplication In Third-Grade.

2. Related Works/Literature Review

a. Scientific approach

The scientific approach is a trending approach adopted in the 2013 curriculum. This approach is widely used in the current RPP. The scientific approach is well-known for its scientifically structured and systematic scales. Scientific approach uses the steps and scientific rules in the learning process⁷. Scientific steps applied include finding problems, formulating problems, submitting hypotheses, collecting data, analyzing data, and drawing conclusions. The scientific approach is intended to give the learners an understanding to understand, to practice, what is being studied scientifically. Therefore, in the learning process is taught so that learners find out from various sources through observing, asking, trying, processing, presenting, concluding, and creating for all subjects).

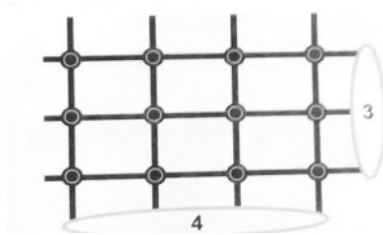
Step-step scientific approach⁷:

- 1) Observing
- 2) Questioning
- 3) Associating
- 4) Experimenting
- 5) Networking

b. Method cross line multiplication

Cross Line Multiplication is a multiplication method derived from Japan. This method was made by Professor Fujisawa Rikitaro in 1900 from the Imperial University of Tokyo. The method of multiplication is based on geometric. This method of multiplication in Japan is very useful for those who have no knowledge of details and multiplication². Cross Line Multiplication Method is a visual way to represent multiplication by using line and intersection of line¹⁰. This multiplication method is easier to do than using a finger because this method turns the abstract mathematics more concretely, making it easier to multiplication⁸. Examples of using this method as giving⁵:

$$3 \times 4 = ?$$



3 Horizontal line

4 Vertikal line

The point that intercept line as much 12 point.

$$\text{So, } 3 \times 4 = 12$$

c. Understanding concept multiplication

There are 5 standards of mathematical ability 2 of them: first, understanding in which Comprehending mathematical concepts, operations, and relations—knowing what mathematical symbols, diagrams, and procedures mean. Second, Computing: Carrying out mathematical procedures, such as adding, subtracting, multiplying, and dividing numbers flexibly, accurately, efficiently, and appropriately⁹.

When we understand a concept then we will be able to work on various forms of problems related to the concept and when we can understand a concept then we can connect with other concepts. Because NCTM Standards states that mathematics should be directed at 3 capabilities one of which understands how mathematical ideas are interrelated to one another⁴. The ability of mathematical understanding is one of the important objectives in learning, giving the understanding that the materials taught to the students are not just rote, but more than that with the understanding of the students can better understand the concept of the subject matter it self³. Understanding the concept is dealing with the understanding of comprehensive and functional mathematical ideas. indicators of the ability to comprehend mathematical concepts in regulations Dirjen Dikdasmen Number 506/C/Kep/PP/2004, detailing the indicators of understanding mathematical concepts is capable⁶:

- 1) Re-state the concept
- 2) Classify objects according to the character
- 3) Provide an example and not an example of a concept
- 4) Presenting concepts in various mathematic representation forms
- 5) Developing terms of need or terms of enough from a concept
- 6) Using and utilizing and selecting certain procedures or operations
- 7) Implementing concept or algorithm in troubleshooting

Indicators of the ability to comprehend mathematical concepts in curriculum 2013⁶:

- 1) Representing the concept that has learned
- 2) Classifying object-object based in following requirements requiring the concept
- 3) Identify the nature of the operation or concept
- 4) Applying the concept logically
- 5) Provide examples or example contrary of the concepts studied
- 6) Presents the concept in various forms of mathematical representation (table, graph, diagram, sketsa, mathematical model, or otherwise)
- 7) Relating multiple concepts in mathematics or outside math

- 8) Developing needs and / or conditions required a concept
 - 9) Developing terms of need and/ or terms of enough from a concept
- d. Previous research
- 1) In a study conducted by Fahinu & Palaki, (2015) showed a scientific approach affecting the ability understanding mathematical of grade VIII SMP students on algebraic material¹. The results of this study show that scientific approach can use to improve ability understanding mathematical of and it can be tried in primary school.
 - 2) In a study conducted by Amrullah (2013) using Tipot (Titik Potong) techniques to give effect to the understanding of mathematical concepts in the material of the fourth grade students of elementary school, it shows this technique affects the understanding of multiplication¹². The results of this study show that cross-line techniques can to improve understanding of multiplication and try using in the third grade and using scientific approach.

3. Material & Methodology

a. Data

The data ability understanding concept multiplication retrieval use test instruments when pre-test and post-test. The test instruments using 5 indicators of the ability to comprehend mathematical concepts:

- 1) Representing the concept that has learned
- 2) Provide examples or example contrary of the concepts studied
- 3) Applying the concept logically
- 4) Presents the concept in various forms of mathematical representation (table, graph, diagram, sketsa, mathematical model, or otherwise)
- 5) Implementing concept or algorithm in troubleshooting

Form test instruments which is modified from book hard skill and soft skill so that test instruments validity and reliable compared create your own. there are 5 questions representing the ability to comprehend the concept of multiplication.

b. Method

The research methods use one-group experiment where teaching on one class uses the scientific approach with method cross line multiplication. Before treatment researcher give students pre-test and after treatment researcher give students post-test. The population of the study was the third-grade students of the elementary school Isola. The sample of the study was all of the third-grade B 38 children. The sampling technique was done by purposive sampling. The step-step teaching can see can be seen in the chart below:

Table 1. Step-step teaching

Step-step approach	scientific	Description
Observing		Teacher give question to students about multiplication and see student response.
Questioning		Teacher answer the question with method method cross line multiplication. Teacher give a statement can answare multiplication with method method cross line , it can make students ask if they can answer the question about multiplication.
Experimenting		Students are formed in groups to prove teacher statement by using LKS.
Associating		Students in groups discuss dan answare the question
Networking		Representatives in the group appear in front of the class deliver the results of his work

4. Results and Discussion

a. Result

1) Mean post-test and pre-test

Tabel 2. Mean post-test and pre-test

Test	N	Mean
Pre-test	38	28
Post-test	38	69

Source: Ms. Excel 2010

Based on from table, it can be seen that mean post-test students low from 38 students only 28 dan after give treatment mean post-test increased. This shows that scientific approach with cross line method for multiplication increase student understanding on the concept of multiplication.

2) Comparison indicators post-test and pre-test

Tabel 3. Comparison indicators post-test and pre-test

Test	N	Indicator 1	Indicator 2	Indicator 3	Indicator 4	Indicator 5
Pre-test	38	1	10	5	5	8
Post-test	38	17	10	13	12	12

Source: Ms. Excel 2010

Based on from table, it can be seen that indicator 1 (representing the concept that has learned), indicator 3 (Applying the concept logically), indicator 4 (Presents the concept in various forms of mathematical representation), and indicator 5 (Implementing concept or algorithm in troubleshooting) after give treatment post-test increased but only indicator 2 (Provide examples or example contrary of the concepts studied) has not changed. This shows that scientific approach with method cross line multiplication can increased 4 indicators ability understanding concept multiplication.

Example of student work

PRE-TEST

POST-TEST

PRETES PEMAHAMAN KONSEP PERKALIAN

NAMA: Siti
KELAS: 3B

- Apakah yang dimaksud dengan perkalian X
- Mamakah yang termasuk kedalam bentuk perkalian ...
 - a. $4 + 4 + 4 = 12$
 - b. $4 \times 3 = 12$
 - c. $12 : 3 = 3 - 3 = 0$
 - d. $12 - 3 = 4$
- Ibu Susi memiliki 4 papan telur yang masing-masing berisi 9 butir telur. Berapakah banyak telur yang dimiliki Ibu Susi. Kerjakan dalam bentuk penjumlahan berulang. 9 + 9 + 9 + 9 = 36
- Jawab soal no 3 dengan menggunakan perkalian. 4 x 9 = 36
- Budi minum susu satu hari dua kali pagi dan malam, maka berapa liter dalam seminggu Budi minum susu. 14

POSTES PEMAHAMAN KONSEP PERKALIAN

NAMA: Siti
KELAS: 3B

- Penjumlahan berulang adalah pengertian dari ditambahkan
- Mamakah yang termasuk bentuk perkalian yang benar ...
 - a. 12
 - b. 12
 - c. $12 \times 4 = (10 + 2) \times 4 = 40 + 8 = 48$
 - d. $12 \times 4 = (20 + 1) \times 4 = 80 + 4 = 84$
- Bapak Tono mempunyai 3 akuarium yang berisi masing-masing 13 ekor ikan. Berapakah banyak seluruh ikan Pak Tono? (Gunakan cara susun dibawah) 39
- Jawab soal no 3 dengan menggunakan perkalian menggunakan garis. 4 x 9 = 36
- Rani suka berenang setiap hari berenang Sabtu dan Minggu dalam 3 minggu berapakah Rani berenang. 6

Based on from example pre-test and post-test, for pre-test student can be answer question true number 3, number 2 almost true but can't true answer question number 1, 4, and 5. It show student understanding on the concept of multiplication low. After give treatment student and give post-test student can be answer question number 1,4, and 5. But number 2 student almost true, for this case student need more practice to know examples or example contrary of the concepts of multiplication

b. Discussion

Based on relust mean post-test the researcher did not expect relust very low, many students can't answare the question. It make mean post-test become low. This happens can because many studensts in the class make student not focus in class and student lazy to take notes. After teaching using scientific approach with method cross line multiplication mean post-test can be increase. This show visual represent multiplication by using line and intersection of line make student easy to understanding on the concept of multiplication ¹⁰.

Comparison indicators post-test and pre-test can be seen that indicator representing the concept that has learned very low. This happens can be because the concept of multiplication can not be understood by the students and students don't repeat study at home. Indicator representing the concept that has learned can be increase after give treatment. Indicator provide examples or example contrary of the concepts studied has not changed. This happens can because students are difficult to distinguish examples or example contrary of the concepts studied, so students need a lot of practice to be able to distinguish examples or example contrary of the concepts multiplication.

Indicator applying the concept logically for pre-test result not good but can increase after give treatment. Reason student can answer because student can not understand the problem, so student need discussing many questions. Indicator presents the concept in various forms of mathematical representation same wih indicator applying the concept logically in the post-test result not good but can increase after give treatment. This happens can because students routine thinking, so teacher teach an innovative way to answer questions. Indicator implementing concept or algorithm in troubleshooting same with indicator another, in the post-test result not but increase after give traement. Student can answare the question because understanding concept multiplication, so students need more practice. This Result in line result research Fahinu & Palaki (2016) use scientific approach to improve understanding mathematical and Amrullah (2013) using Tipot (Titik Potong) can improve understanding concept multiplication. The combination scientific approach and cross line multiplication can give students innovative learning.

5. Conclusion

A conclusion from this study is scientific approach with cross line method for multiplication proved to improving student understanding on the concept of multiplication. For Future research add more research variable and many meetings. The benefit this research can give innovation to teach in 21st century because combination scientific approach and cross line method for multiplication appropriate to teach concept multiplication. Recommendations for future research can use another approach or another method.

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