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The Application of Bruner's Learning Theory on Teaching Geometric at Smp Negeri 2 Sipahutar in Academic Year 2017/2018

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***Abstract*— *This study aimed to find out the activity and learning outcomes of the eight grade mathematics students at SMP N.2 Sipahutar in academic year 2017/2018 on the application of Bruner's theory on the subject of parallel lines. The subject of this research was the eight grade students of SMP N.2 Sipahutar in academic year 2017/2018, while the object of research was the result of learning and students' activity while learning with the application of Bruner's theory on the subject of parallel line. This research was a descriptive research, and the instrument of data collection used was the test in the form of description and students' activity observation sheet. Based on the result of data analysis, the results of the research are: (1) The average score of learning result obtained by students is 24.64 with the average grade 77.02 or with the percentage of mastery level of 77.02%. It shows that the students' level of mastery is still classified as moderate. (2) Student's learning completeness: a) Persuasion ability, many students who completed the study were 27 students, while the unfinished study was 4 students, b) Classical absorption, from 31 students there are 27 students or 93.55% completed the study, while the unfinished study is 4 students from 31 students or 6.45%. It shows that classically, the students' learning completeness is achieved; (3) Achievement of specific learning objectives was over 65.0%. (4) Students' activity, activity level on first learning is equal to 75,71 and the mean of students' activity reliability level is equal to 82,62%; students' activity level on the second learning is equal to 88,82 and the mean of students' activity reliability level is equal to 84,61%, it concluded that there is increase of students' activity during learning.*

Keywords*— *Bruner's Learning Theory, Geometric.

I. INTRODUCTION

The issue of educational quality came to the fore of a national issue. The quality of education is questioned as the consequence of the students' unsatisfactory learning outcomes. Improving the quality of education can only be achieved through improving the quality of education processes that leads to the improvements in the quality of educator products. According to R. Soedjadi, the education process can run well when there is a harmonious interaction between the elements, namely: (1) education participants (2) educators (3) means (4) curriculum in the broad sense, and evaluation of learning outcomes (Soejadi, 1991: 5). To know the quality of education, one indicator can be the result of student learning. Therefore, one way to improve the quality of education is to improve the achievement of students' learning outcomes.

The low achievement of students can occur, because the elements in teaching and learning process have not been handled optimally and proportionally.

According to R Soejadi (1989), no matter how precise and well mathematics teaching material set, not guarantee the achievement of the desired mathematics education goals. One of the important factors to achieve the goal of education is the learning process that is implemented. The process of learning to teach math needs to emphasize the optimal involvement of the learners consciously. In order for the teaching-learning process that students can engage optimally, the teacher's role is clearly a key factor. According to Ron Brandt in Mariani (1994) almost all reforms in education such as curriculum renewal and the adoption of new teaching methods ultimately depend on teachers. One effort that can help teachers to improve student engagement in the teaching-learning process is that teachers must be consciously able to apply relevant learning theories. Deliberately geometry is selected, because many facts show that students have difficulty in the field of geometry. Difficulties in the field of geometry have been experienced by students since the elementary school. This is supported by the findings of R Soejadi (1991: 4), namely: In the last few years, both in mass media and in certain meetings, informed and even lead to concerns about elementary school math subjects, or even the level of junior and high school. Unit of geometry appears to be a unit of mathematics in elementary school that is classified as a difficult unit. The statement which is in line with the statement once made by Del Grande (1983) in Ronald (1995: 4) states: "Educators of the work ask this question: why is it that so many students who master the most subjects, get nowhere in their study of geometry? From the description above indicates the vulnerability of

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mastery of teaching materials geometry which leads to the low mastery of students of facts and concepts of geometry. Many factors can be the cause of the low mastery of facts and geometric concepts. To see the students' intellectual involved in learning geometry, the teachers need to track students' intellectual development. Therefore, the teacher is also required to be able to apply the theory of learning in the process of teaching and learning. Based on the above description, the authors conducted a research in a junior high school entitled: "The Application of Bruner's Learning Theory on teaching geometry in SMP N.2 Sipahutar in academic year 2017/2018"

The Research Problem

In accordance with the back ground of the study, the formulation of the problem in this study is: "How are the students' learning outcomes of the eight grade students at SMP N.2 Sipahutar in academic year 2017/2018 with the application of Bruner's learning theory on the subject of parallel lines?"

The Research Objective

This study aims to determine: the students' learning outcomes of the eight grade students at SMP N.2 Sipahutar in academic year 2017/2018 with the application of Bruner's learning theory on the subject of parallel lines.

II. REVIEW OF LITERATURE

Teaching Geometry in Junior High School

In teaching geometry, according to Soemadi (1994), there are known global methods and methods of unity. The global method is inductive and begins with the observation of the whole thing, followed by observation and recognition of its parts. The method of unanimity begins by introducing elements, then, the elements are compiled. In this method, the two and three dimensional spaces are separated and the concepts are axially deductive. To prove some theorems axioms, postulates and previous theorems are used. In teaching geometry of unity, there is a strict sequence to the understanding and its theorems. Based GBPP (Indonesian Curriculum) 1994 for junior mathematics subjects, it can be observed that there is a new approach, which introduced the deductive approach. It is said to be a new approach for junior high school students, because the previous curriculum of the 1984 curriculum, teaching geometry using an inductive approach. In the introduction to the mathematics text book 2a for the second grade of junior students, R Soejadi said: *"Satu hal baru dalam unit geometri kelas 2 SLTP ini terdapat pada bahasan garis sejajar. Unit ini disusun secara khusus. Ini disengaja agar para siswa, setelah tujuh tahun belajar matematika, dapat mengenal lebih baik bagaimana sebenarnya matematika itu disusun. Dalam unit ini dikenalkan beberapa kesepakatan yang mendasari susunan khusus geometri yang harus dipegang teguh dalam mempelajari matematika selanjutnya"* "One new thing in this junior second class of geometry unit is the parallel line. This unit is specially structured. This is intentional for students, after seven years of math learning, to get to know better how mathematics is actually structured. This unit introduced several agreements underlying a special arrangement of geometry that must be adhered to in learning the next math" The deductive approach is specifically introduced to the topic of parallel lines. This topic was given in the 2nd grade students of SMP Catur Wulan 1. The sub-topics of the parallel lines according to the GBPP are:

- To know the meaning of parallel lines through the repetition of the congruent rectangular intercepts.
- To know the nature of parallel lines are:
  - Through a point outside the line can be drawn exactly a line parallel to the line.
  - If a line cuts one of two parallel lines, then it will also cut the second line.
  - If a line parallel with two lines, then the two lines are also parallel to each other.
- To know the angles that occurs if two parallel lines are cut by a line, e.g., angle to the inside, inside opposite, outside opposite, unilaterally and unilaterally.
- To recognize the angle relationships on two parallel lines cut by a line, e.g., the same angle to the same extent, the opposite outer angle as large, the unilateral inner angle of 1800, and the unilateral outer angle of 1800.

Bruner's Learning Theory and Its Application

Jerome Bruner is a developmental psychologist and cognitive psychologist from the United States. In his work, he combines psychological research and classroom practice. He conducted research to revive human interest in the "cognitive process" that is to receive, store and convey information ". Bruner has promoted a laboratory studies of the problem of "cognitive processes" that involve thinking and learning abilities. The main center of his work is the concept of development. Bruner did not develop systematic learning theories. What matters to him is how to choose, maintain and transform information actively, and this is what he thinks as the essence of learning. The Bruner approach to learning is based on two assumptions. The first assumption is that the acquisition of knowledge as an interactive process, meaning that students learn to interact with the environment actively and the changes that occur not only in the environment but also in itself. The second assumption is that students construct their knowledge by connecting incoming information with previously stored information. Bruner is only interested in the results of the interaction stages that are revealed in the minds of children. He argues: "If we are of benefit from contact with recurrent regulars in the environment, we must represent them in some manner. To dismiss this problem as "mere memory" is to misunderstand it. For the most important thing about memory is not the storage of past experience, but rather the retrieval of what is relevant in some usable form. This depends so that it may be relevant and usable in them present when needed. The end product of a system of coding and processing is what we may speak of as a representation ". (Bruner in Rensick, 1964: 112) Bruner argues that learning involves three simultaneous processes. The three processes are: (1) obtaining new information (2) transforming information and (3) testing the relevance and determination of knowledge. According to Bruner, children develop through three stages: enactive, iconic and symbolic stages. The sequence of stages proposed by Bruner does not relate the stage of thinking to the age of the child. In the enactive stage, children learn by using / manipulating objects directly. In the iconic stage, children's activities develop and lead to things that are more abstract. At this stage there is a process of mental imagination about an object, but does not manipulate it directly. In the third stage symbolic, the child directly manipulate the symbol without any referent with the objects. In developing his work for classroom teaching Bruner argues, if enactive, iconic and symbolic develops, it is possible to teach new concepts. Nevertheless, Bruner in Resnick cautioned that: "and even though some students may be quite" ready "for a purely symbolic presentation, it seems that wise, nevertheless, to present at least the iconic modes as well to fall back on in their case symbolic manipulation failed "(Bruner, 1996: 114). Bruner's suggestion implies that the development of ideas in the subject matter must be balanced with the development of the intellect. Bruner formulates four theories about learning, namely construction, notation, contrast and variation and connectivity (Bell, 1978: 78).

Construction: This theory states that the best way for a student to start learning concepts and principles in mathematics is to construct that concept or principle. To construct a concept or principle is to simplify the concept or principle by considering the parts that make up the concept or principle. In relation, Bruner argues that "Any idea or problem or body of knowledge can be presented in a form that is simple enough so that any particular learner can understand it in a recognizable form." (Bruner, 1996: 113). According to Bruner in Bell (1978) the notion of a concept in the early stages of students learning the concept, is dependent on activities that use concrete objects. The implications of that theory in the teaching of mathematics are that new concepts are inappropriate when they are presented deductively. This is reasonable, if using indicator stages as proposed by Bruner, namely enactive, iconic and symbolic. Another implication is that students' activities to construct concepts or principles can be generated by rewriting the questions of understanding or illustration that form the concept or principle.

Application 1

Topics : Parallel lines
Sub topics : Know the meaning of parallel lines
Class : VIII
Prerequisites : Students already know about tiling
Presentation model : To explain the concept of parallel lines, the teacher can begin by showing some images containing parallel lines, as well as objects around the student. After that the students are also taken to the material that has been received, namely the problem of tiling. Finally, the teacher can explicitly explain when two straight lines are said to be parallel. To be more convinced that the student has indeed mastered the notion of alignment of two straight lines, the teacher should prepare some drawings of both parallel and non-parallel lines and the students are told to show which ones are aligned and which are not.

Notation: The Notation theory states that the initial construction is made simpler cognitively and better understood by the students if the construction is according to a notation that matches the intellectual development level of the student.

The implication of this theory on the teaching of mathematics is that in the use of notation both for concepts or principles adapted to the level of student development. A notation for a concept should at least point to one notion and not another. The use of notation that is not in accordance with the level of intellectual development of students obviously will disrupt the students understanding.

Application 2

The alignment notation of two lines such as "/ /", and the "∟" angle notation must always be kept consistent, as well as the naming of points, line naming, right angle notation and so on.

Contrast and variation

The theory of contradiction and variation suggests that the procedure of learning mathematical ideas running from concrete to abstract must be included in the contradictions and variations (Bell, 1978: 144). According to Herman Hudoyo a mathematical concept would be meaningful if the concept is compared with other concepts (Herman Hudoyo, 1995). This theory is in line with the opinion of Skemp, which states that the concept is the result of abstraction, therefore to form a concept requires a number of experiences that have similarities (Skemp, 1982: 32). Thus, when students learn mathematical concepts, the examples must vary so that students' understanding will be deeper. The application of this theory to the teaching of mathematics is that in teaching a concept must be given counter concept. In addition, examples and non examples

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given to a concept or principle must vary. The results of Cohen's study (1980) of 54 students who received lessons through video tape showed that presenting examples rather than counter example resulted in better concept mastery than just providing examples. The results support the research by experts such as Markie and Treman, Shumaway and Tennyson, Steve and Bratwel who conclude that "not an example" is very effective in learning concepts (Cohen: 1980)

Application 3

Teachers can show students a variety of geometry builds, and ask which lines are parallel and which are not and why so.

Connectivity

The connectivity theory states that in math, every concept, structure and skill is connected with other concepts, structures and skills. Although the explanation of the concept or principle needs to be linked to the previous concept or principle, it does not need to be associated with previous concepts that are too far away. The application of this theory to the teaching of mathematics is that in the explanation of a new concept or principle, is by firstly given illustration of the previous concept or principle. Furthermore, the definition or proof of the concept or principle is given. The illustration of the concept or principle can be through both examples and non-examples.

Application 4

Topics : Parallel lines
Sub topics : Recognize the angles that occur if two parallel lines are cut off another line
Class : VIII (Eight Grade)
Prerequisites : Students already understand about the angles that are mutually parallels, angle, contrary and the characteristics of parallel lines.
Presentation Model : Before the teacher explains the properties found if two straight lines are cut by another line, the teacher needs to bring back the students' memory of angles, angular relationships, opposite angles and so on.
In broad outline, the model of instruction directed by Bruner in accordance with the principles of learning that it proposes should include: (1) optimal experience of students to want and can learn (2) structuring knowledge for optimal understanding (3) details of the order of presentation of the material optimally by taking into account learning factors before, the level of student development, the nature of subject matter and individual differences and (4) the form and the provision of reinforcement (Ratna Wilis, 1988: 133).

III. RESEARCH METHODS

The Research Sites/location

This research was conducted in SMP Negeri 2 Sipahutar. The reason for the selection of this research location is that the same research has not been done, and the learning that has been done so far is still focused on the teacher.

The Subject and Object Research

The Subjects of this study were students of class VIII SMP Negeri 2 Sipahutar in academic year 2013/2014, while the object in this study is the activity and learning outcomes on learning with the application of Bruner's theory of learning on the material of parallel lines

The Types of Research

In accordance with the research objectives that have been mentioned in Chapter I, this research was a descriptive study that described the actual condition / result of learning.

The Research Procedures

The steps taken in this research were as follows:

a. Preparation phase

At this stage the author analyzed the material of parallel lines in class VIII of SMP (Junior Students). Then make a lesson plan. In accordance with the material, make props as an example that was made by the students at the time of learning.

b. Implementation phase
    - Before the learning was done, on the previous day, the writer told the students to bring scissors, cartons, ruler, plastic bags, printed paper/graph, and glue.
    - Learning process. As the following diagram:

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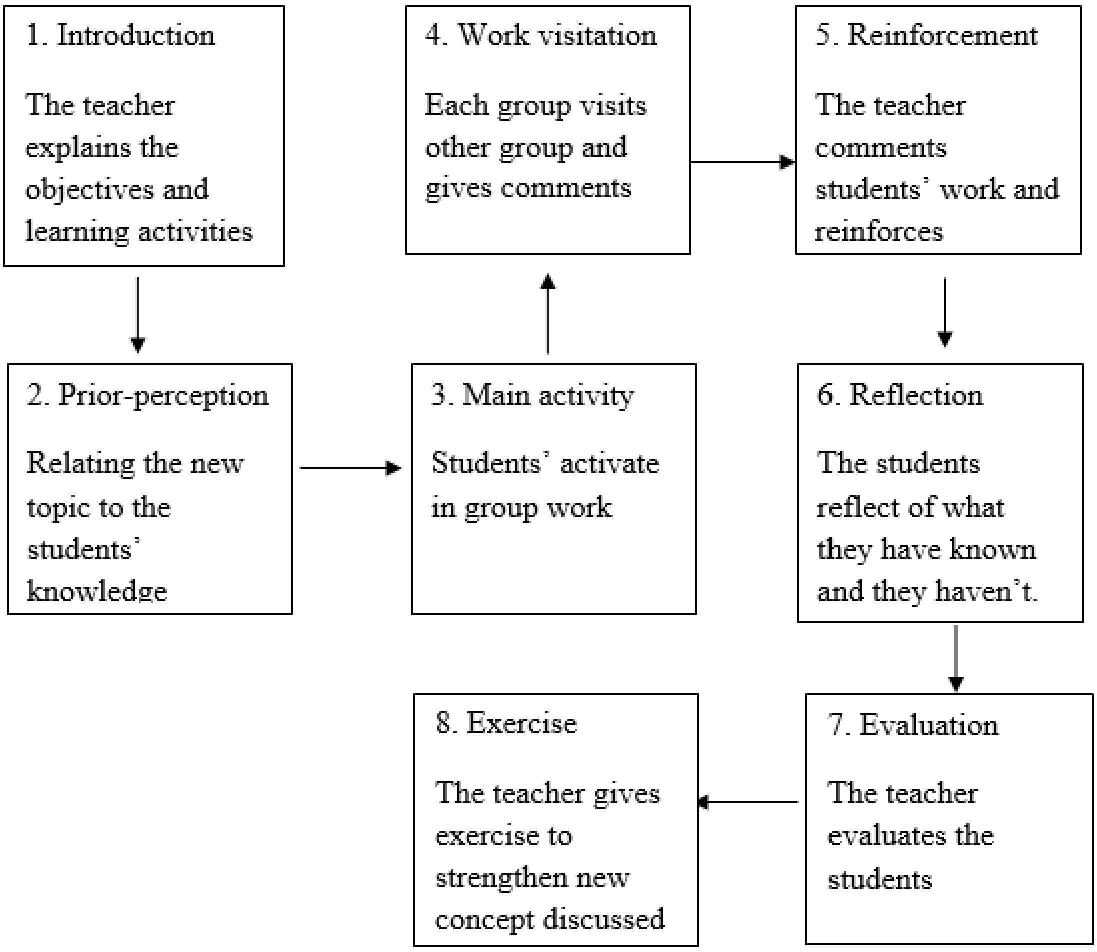

Source: Junior High School Mathematics Learning at LPTK, USAID PRIORITY

- At the next meeting, a test was conducted to determine the level of students' mastery of the material that has been studied.

IV. RESULTS AND DISCUSSION

Based on the calculation results and research analysis results of data obtained:

1. The average score of learning outcomes obtained by students is 24.64 with the average grade is 77.02 or with the percentage of mastery level of 77.02%. This shows that the level of students' mastery is still classified as classical.
2. Student learning completeness
   a) Individual absorption
   The total number of students who completed the study is 27 students, while the unfinished study is 4 students.
   b) Classical absorbency
   From the 31 students there are 27 students or 93.55% of the total subjects who have completed the study, while the unfinished study is 4 students from 31 students or 6.45% of the total subjects. This indicates that the classical completeness of student learning has been achieved.
3. Achievement of specific learning objectives (TPK)
   The achievement of specific learning goals is all above 65.0%. Thus learning has reached the thoroughness of TPK.
4. Students' activity
   From observations made by two observers to the students' activity during learning, the result shows that the students play an active role during the learning, in which the activity level in the first learning is 75.71 and the average of student activity reliability level is 82.62%; student activity level on second learning is equal to 88,82 and the mean of student activity reliability level is equal to 84,61%. It concluded that there is increase of students' activity during learning.

V. CONCLUSIONS

Based on the discussion of data analysis, it's concluded that:

a. Level of students' activity at the first learning is equal to 75,71 (active) with the mean of students' activity reliability level is equal to 82,62% (high), and students' activity level on second learning is equal to 88,62 (active) with the mean of students' activity reliability level is equal to 84 , 61% (high).

b. Learning with the application of Bruner's theory on the material of parallel lines in SMP Negeri 2 Sipahutar in academic year 2017/2018, the achievement has been completed with the following details:

Classical student mastery level of 77.02% is moderate.

1. Absorption of individual students obtained from 31 students, 29 students or 93.55% of the total subjects have completed learning, means have been completed and classically achieved.
2. Achievement of specific learning objectives is all thoroughly achieved

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