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# Application of Example Nonexample Learning Model Based on Bruner's Theory in Identifying Plane Figure

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**Abstract:** Lack of concept mastery is thought to be one of the causes of students' difficulties in learning mathematics. Moreover, a learning management unsuitablewith the level of students'intellectual development and the low active role of students in learning is seen as a trigger for a tenuous control of concepts.This condition underlies the importance of a research, so the goal is to examine the impact of the application of ExampleNon Example learning models, guided by Bruner's Theory. This study employs the design of pre-test and post-test Group Design with a sample of 199 people. Research data were collected by tests and analyzed descriptively and inferentially. The results show that the application of the Examples Non Examples model based on Bruner's theory contributes significantly to improve students understanding ofthe concept of plane figure by 47.8%.

Keyword : Conceptual Mastery Capasity, Example Nonexample Learning model, Bruner's Theory

## 1. Introduction

Lack of conceptual mastery on geometry is shown by several results from earlier studies by, among others, Sudjadi (1991), Fauzan (1996), Bishop (1979), Saragih, S (2014) and Sumardyono (2015). Conceptually, students' problems in understanding geometric plane shapes are reflected in the misconceptions that occur. One of the factors that cause this is managing learning that is not optimal. The introduction of the concept of shape by the teacher typically starts with the use of authentic contexts and then continues with a conceptual explanation with definitions and examples. Teachers often do not realize that, the inadequate understanding of concepts built up with learning materials (real context media) followed by a formal explanation triggers the occurrence of misconceptions. Presentation of concepts that tend to be formal for low-class students is barely well received because they are not in line with their concrete mental development. It is easier for them to understand abstract concepts if they are manipulated into concrete forms.

Presentation of examples and Non Examples of a concept by an authentic context should be followed by examples and no examples ofa concept in semi-concrete form and ended with an abstract (formal) form. This process is regarded as a better learning meaning for students of lower classes. One learning model that is in line with this idea is the ExamplesNon Examples learning model (ENE) that guides Bruner's theory.

Based on the considerations, the aim of this study is to investigate the impact of the application of the ENE learning model that is guidedby Bruner's theory for Conceptual Understanding Ability of plane geometric shapes.

According to Hamdayama (2014), Example illustrates an example of something that the concept discusses, while NonExample illustrates that is no example. Huda (2014) suggested that ENE learning model trains precision and accuracy of students to an existing context around them by analyzing examples of pictures, photos, case or subject.

Both opinions confirms that ENE learning model offers students the opportunity to grasp a concept through observation, the analysis of an example, and a non-example pointed to the concept to be built. Conceptually, ENE learning model emphasizes the creativity of students in developing the conceptual boundary based on their observation. Then, the teacherprovides guidance or intervention to adapt that conceptual boundaries to the actual understanding. This method is considered more suitable for students because teacher-initiated boundaries cannot necessarily be assimilated and accommodated well into students' schemata.

Analysis of examples and no examples in building concepts encourages students to be more critical and practical, so that learning becomes more meaningful. This is one of the advantages of ENE learning model in building concepts. This statement shows the superiority of ENE learning model in fulfilling the aspects of mathematical skills and mathematical thinking. Buehl (1996) states that the advantages of ENE learning models are: (1) students are more critical in analyzing images; (2) students know the application of the material in the form of example images; (3) students are given the opportunity to give their opinion.

The curriculum also mentions the advantages of the ENE learning model: (1) Students start from a single definition that is then used to broaden their understanding of the deeper and more complex concepts; (2) students are involved in a discovery concept that encourages them to gradually develop concepts through ENE experience; (3) students are givencontradictory statements to examine the characteristics of a concept by considering the non-examples that possibly still have some parts that characterize the concepts described in the examples section.

Constructivism is one of the learning theories in mathematical learning, which means that learning means building up knowledge that emphasizes discovery. Bruner considers learning to discover to be in accordance with the active search for knowledge by people, and to give the best result in it. This condition will evoke the curiosity of the students. Therefore,the studentswill be encouraged to enthusiastically participate in various concepts and principles; they know the steps to find a mathematical formula.

According to Bruner (in Hudoyo, 1990), learning mathematics is learning the concepts and structures of mathematics in the material being studied; it searches for the relationship among concepts and among mathematical structures. During the learning process, children should be given the opportunity to manipulate objects or props specifically designed and to which students can tinker to understand a mathematical concept. The use of educational media will increase the role of senses, so that the established learning experience become more meaningful, longer lasting and easier to apply.

In theory, Bruner also suggested the thesis that the most effective way for students to learn a principle in mathematics is by constructing, as a representation of the concept or principle. Elder students can understand a concept or principle in mathematics simply by analyzing a representation presented by their teacher. For most students, especially for younger students, the learning process will be better andeasier if the students construct their own idea of what is being taught. When students can construct their own representations, they can find their own concepts

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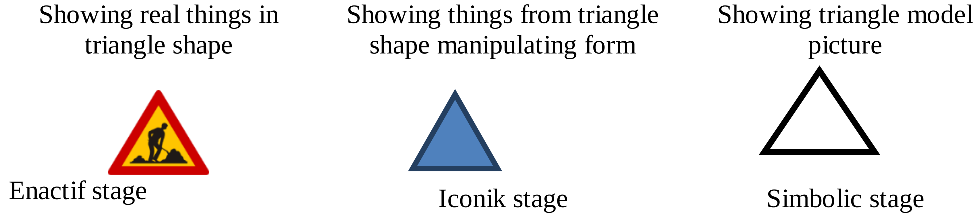
or principles in the representation more easily.Then,the concepts will be easily memorized and applied in appropriate situations.

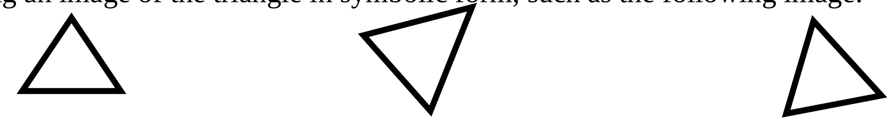
The preceding statement indicates that in building a concept, students should be given the opportunity to get to know the representation of a concept. This will enhance students' learning experience, so that it lasts longer and can be more easily revealed again.

Insight into the principle of forming a new learning experience, especially for children of the age of primary school students, Bruner argues that knowledge should be built up through enactive, iconic and symbolic stages. This means the representation in question is not limited to representations in examples of studied mathematical objects, but also the representation of the process of forming the concept in accordance with the mental development of students. This means that when showing an example of a concept by an object or model of an image, the object or model of the example given must be diverse. Therefore, students can see from the representation the similarity of the attributes of the object.

To illustrate the above-mentioned representation, the following illustrates one example in introducing triangles that can be taken with the following steps:




After the students understand the concept of the above process, it should be enhanced by displaying an image of the triangle in symbolic form, such as the following image:



Linked to the concept, Hamalik (2009) says: "Understanding is the ability to explain a situation or an action." According to Purwanto (2006), understanding is the ability to understand the meaning of a material that has been learned, is seen in a person's ability to interpret information, to predict the consequences of an eventand other similar capabilities.

Referring to this view, understanding can be interpreted as the ability to explain or interpret or represent information or situations. In the context of the concept of plane geometric figures, the intended concept is the ability to explain or interpret the concept of plane figures.

In the context of mathematics, concepts are limits that can classify or classify (objects) from examples or not from examples, Sudjadi (1991). Then Hamalik (2009) states, "the concept is a stimulation class with common characteristics." By paying attention to the constraints of the concept, a student is consideredas having an understandingof a concept only if he can show/identify something/object, whether it is an example or not an example of the concept based on common attributes.

From the limitations of the concept and concepts above, it can be said that understanding concepts is the ability to recognize attributes of concepts so that they can identify examples and non examples of a concept. KPK is an important part of learning mathematics as a basic skill to continue building other mathematical skills, such as communication, reasoning, connection, representation and problem solving. In NCTM (2000) it is stated that understanding of the concept is one of the most important mathematical skills in the principles of mathematics learning.

Skemp (in Afgani, 2011) states that there are two types of conceptual understanding: instrumental understanding and relational understanding. An instrumental concept is interpreted as an understanding of individual concepts and merely remembering simple calculation formulas. In this case, a student only understands the order in which the algorithm works. Relational understanding, on the other hand, contains schemas and structures that can be used to solve broader and meaningful problems.

The PPPG team for mathematics (in Dafril, 2011) has provided seven indicators for understanding concepts, namely:
1. Recreating a concept.
2. Classifying objects according to certain characteristics according to the concept.
3. Giving examples and non-examples of concepts.
4. Presenting concepts in different forms of mathematical representation.
5. Developing necessary conditions or sufficient requirements from a concept.
6. Utilizing and choosing certain procedures.
7. Classifying problem-solving concepts or algorithms.

Based on the description above, it can be stated that KPK is the ability of a person to recognize the attributes of a concept.As a result, that person can: restate a concept; classify objects according to certain traits related to the concept; give examples and non-examples a concept; present concepts in various forms of representation mathematically; develop necessary conditions or sufficient conditions of a concept.

Based on the previously stated types of conceptualunderstanding; paying attention to the topic of geometry and the subject of research, in this study the ability to understand concepts is measured by some indicators: (1) classifying mathematical objects; (2) finding examples of a concept; (4) providing an example and not an example of a concept(5) restating the concept of mathematics in students's own language.

## 2. Methodology

Based on the study question, the desain used is *Pretest and Postest Group Design* as below:

| A | $O_1$ | $X_1$ | $O_2$ |
|---|---|---|---|
| A | $O_1$ | $X_2$ | $O_2$ |

Ket: A : Random Sampling
O : Concept mastery ability measurement
$X_1$ : ENE learning treatment
$X_2$ :ScientificLearning Treatment

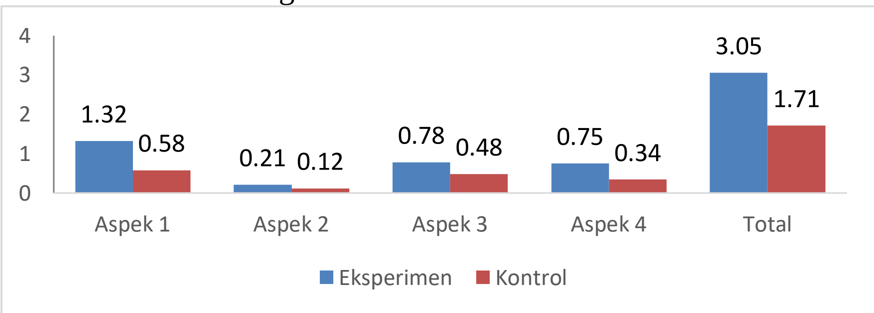
The subjects of this research were third-level primary school students. The schools were chosenfrom three levels: lower, middle and higher level primary schools, based on the ranking of National examination score in Pekanbaru City in 2018. Each school level was represented by one primary school and each primary school was represented by two classes, the randomly assigned experimental and control classes.

The research data are the KPK collected by tests and analyzed by descriptive statistics to describe the increase on subjects' KPK. Inferential statistics were also used to investigate the significance of the impact of the treatment on the KPK.

## 3. Result And Discussion

On the basis of the students' answers, the KPK description/profile is obtained as shown in the following diagram.

Diagram. 1 Profil KPK Bangun Datar




The diagram above shows the average increase of the score of the KPK of the experimental group was higher than the control group with a difference of 1.34 points. If analyzed based on the aspects of KPK in general, the experimental group students were better than the students of the control group. This fact shows that descriptively, students who are taught by the ENE learning model based on Bruner's theory have a better KPK than students who are taught by the scientific approach.

To see if the contribution is significant or not, it must be further tested. The following table shows the results of the calculation of the difference between the average increases in KPK between the two groups.

**Table 1. Test Results of Means difference on increase in KPK**

| SV | N | Rataan N Gain | S | $t_h$ | $t_{t\ (\alpha = 0.01)}$ | Kes |
|---|---|---|---|---|---|---|
| Eskperimen | 97 | 2,92 | 2,15 | 4,43 | 2,326 | Ho Tolak |
| Control | 102 | 1,62 | 1,94 | | | |

The results of the test above indicate there is a difference in the increase in the KPK between the two groups. Taking into account the N-gains of both groups, it can be said that ENE learning led to Bruner's theory contributed significantly to the increase of students' KPK. The result of this study is in line with the results of previous research conducted by: Novia Tri Yuniawati, et al (2015), Damiati, (2013), Dwi Asmayanti, (2017).

Students' empowerment in building their learning experience through observation, analysis of examples and non examples of a concept is a form of implementation of the theory of constructivism-learning. The application of the learning steps in Bruner's theory offers a deeper meaning of learning because they can see mathematics from a concrete (scientific) point of view to an abstract (formal) form. Both learning processes are seen as a contribution to the increase of students'plane figures KPK.

The results of this research indicate that in improving the quality of mathematics learning, teachers do not need to think about how to teach a material, but to think about how they can help students build their knowledge. Teachers must see this paradigm not asa constraint of information for students, but always pondering how to teach students. The teacher has the task of helping students build and develop their reasoning by creating an atmosphere of learning that can encourage students to ask questions, question their ideas and express them.

The not optimal increase yet of students'plane-figures KPK shows that there are still some misconceptions among them. Therefore, it is necessary to undergo further study on the location of the misconception, as input in planning the next improvement in learning. Based of the results of the analysis of student answers, an overview of the misconceptions in table 2 was obtained

Table 2. Student Misconception in Plane Shape

| **Misconception** | **%** |
|---|---|
| Rhombus is called Square or vice versa | 78,9% |
| Rectangle is called Square or vice versa | 2,6% |
| Paralellogram is called Rhombus or vice versa | 23,6% |
| Paralellogram is called Rectangle or vice versa | 57,2% |
| Trapezoid is called Paralellogram or vice versa | 48,2% |

By paying attention to the students' misconceptions in Table 2, it can be drawn that students, when observing examples and non examples of concepts of plane geometric figures, put more emphasis on the aspect of the side. Related to this, theresearch on several students who have experienced misconceptions revealed these facts:a diamond is called a square because all its sides are the same; the rhombus is called parallelogrambecause the shape is the same; the square is called a rectangle because the shape is the same and there are equal-in-length sides.

Therefore, to minimize misconceptions, the main distinctive features of plane figures must be emphasized by prioritizing the key identification data already known to students. Then in the presentation of examples and non examples of a concept of plane figures, it is necessary to contrast with the most similar figure. For example, after understanding the concept of squares and diamonds, students should be facilitated by restructuring their knowledge by comparing the square and the diamond both from their sides and their angles.

Contrasting has an important role in strengthening the concept. However, it must pay attention to the most similar concept ofplane figures, so students can clearly see the differences and the similarities. Then, pay attention to the mental development stages of the research topic and the learning steps used are leaps in the learning process. The leap in question is between step 2 and step 3; students must receive learning tools that are an example and not an example of a concept that is contrasted according to the immediate family. Then, students are asked to classify planefigures that are concepts and not concepts. This learning activity is seen as an opportunity to reinforce the learning experiences of pupils acquired in the second phase as a learning bridge in step 3. In addition, the addition of learning activities is an attempt to restore (improve) the learning experience obtained in step 2, if the experience is not yet mature.

## 4. Conclusion

Based on the results of the data analysis and the discussion, it can be concluded:

1. The average increase in the score of the KPK was built up flat by the students who were taught the ENE learning model, so that the Bruner’s theory was higher than students who had a scientific approach, both general and on the basis of the aspects of the rising of the KPK.
2. The implementation of the ENE learning model, guided by Bruner's theory, contributed significantly to the increase of the KPK at level level by 47.8%.

## Suggestion

Referring to the conclusions and discussion of the results of the study, there are some suggestions or recommendations that should be considered if a similar study is to be carried out:

1. When presenting an example and a non-example of a concept which students will follow when constructing a concept, it is necessary to pay attention to the contrast of the plane figures on the basis of the nearest clog. This is so that students can improve accuracy and care when observing the main distinctive features between plane figures after understanding the similarity of characteristics.
2. It is necessary to add the learning steps identified in this study, namely after the phase 2 learning activities, students should be given the opportunity to identify the flat building according to the learned concepts by using learning tools to enhance the learning experience they have acquired by observing examples and not mentioning examples presented by the teacher or via Student Activity Sheet.

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