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Increasing the Students' Learning Motivation and Understanding of Concept by Using Examples and Non-Examples Learning

Nurul Astuty Yensy
Mathematics Education Study Program
University of Bengkulu
Bengkulu, Indonesia
nurulastutyyensy@unib.ac.id

***Abstract*—Learning motivation is very necessary as an encouragement for someone to do learning activity so that learning achievements can be achieved and it can be influenced by the method or learning strategy used, and then previous research examining the learning method of Example and Non-Example had never discussed how the student learning motivation, so this study wants to show that Example and Non-Example learning can foster learning motivation and students' understanding of concept. Data was taken through observation, questionnaire, and test that were given to forty students who took part in statistical study. The results of observation in the class showed that students were very active in discussing, and communicating analyzing concept presented in the form of drawings and diagrams and being able to think critically. The results of the questionnaire showed that their learning motivation was high, the majority of students said that learning was very interesting, fun and not stressful. Students also revealed the learning must be maintained especially in statistical subject that were difficult for them to learn so far. The understanding of concept of material was also more improved and based on the test result have been completed.**

Keywords—learning; motivation; examples and non-examples

I. INTRODUCTION

One of the factor that influence the learning outcome is learning method, learning activity and learning motivation. *The motivation theory has been discussed as an important aspect of students' success in schools. Research has shown that motivation influences students' involvement and academic achievement. There also is a growing relationship between motivation and teacher-students' relationships* [1-3]. Then the learning method using images can trigger creativity, so students are more active and can improve brain performance, especially in *the intraparietal sulcus area* [4-6]. This can shape the students' positive attitude towards mathematics and help students understand and improve mathematical ability [7,8].

The learning method that used images namely learning of *Example and Non-example* (hereinafter ENE); this learning method put the students into heterogeneous small groups, concept are given in the form of images, diagrams or tables that are in accordance with the teaching materials and basic competencies [9]. Furthermore, with the learning method, the learning *ENE* process becomes more interesting, more interactive and can improve the quality of students' learning outcome. The approach used is a scientific approach, namely, students solve the problems by conducting careful data collection, and careful analysis of data to produce a conclusion [10].

Many of the results of research on ENE learning, such as students' critical thinking skills with the application of ENE learning in each cycle, have gradually increased and students are more active [11]. The learning of *ENE is* capable train students to actively participate and communicate such as listening skills and speaking skills [12]. The previous research has never been discussed the learning motivation by applying ENE learning. As it is known that learning motivation is very necessary as a motivation for someone to carry out learning activity so that learning achievements can be achieved [13,14]. Thus researcher is interested in examining the extent of students' learning motivation and understanding of concept by using the *ENE* learning.

II. RESEARCH METHOD

This study was conducted in class with 40 students (11 men, 29 women). This student took a statistics course. The study was conducted six times face to face with the ENE learning method (3 times for cycle I, and 3 times for cycle II). Each face was given different material. The concept was presented by displaying the images or diagrams (example images and non-example images), then students in groups discussed analyzing the images displayed. They make a hypothesis and write the different characteristics that appear in the example image and the non-example image, then the results were presented in the class. Furthermore, during classroom learning, researcher observed the students' learning activity. Each end of the cycle was given a learning motivation test and questionnaire.

A. Assessment of Students' Learning Activity

The students' learning activity is analyzed using intervals:

Activity score: $10 \leq x\ 17$ less active
Activity score: $17 \leq x\ 23$ quite active
Activity score: $23 \leq x\ 30$ active

B. Assessment of Concept Understanding

$$P_n = \frac{\sum \text{Score achievemen t of concept for each indicator}}{\sum \text{total score}} \text{x100\%}$$

[15,16]

P_n = Percentage of concept understanding of the n^{th} indicator

The concept understanding interval:

$0.00\% \leq P_n < 33.33\%$ low
$33.33\% \leq P_n < 66.67\%$ enough
$66.67\% \leq P_n \leq 100\%$ high

The indicator score of concept understanding is as follows:

- Indicator 1 (student ability to restate a concept):

  Score 0: no answer
  Score 1: restate a concept but not right
  Score 2: restate a concept but not complete
  Score 3: restate a concept appropriately
- Indicator 2 (classify objects according to certain characteristics based on the concepts studied)

  Score 0: did not answer
  Score 1: classify objects according to certain characteristics but still incorrect
  Score 2: classify objects according to certain traits but not yet complete
  Score 3: classifying objects according to certain properties with the right
- Indicator 3 (giving an examples and not an examples of concept learned).

  Score 0: did not answer
  Score 1: give an example and not an example but it is not right
  Score 2: give an example and not an example but not complete
  Score 3: give an example and not an example correctly
- Indicator 4 (compare and distinguish the concepts)

  Score 0: did not answer
  Score 1: compare and distinguish concepts but not precise
  Score 2: comparing and distinguishing concepts but not yet complete
  Score 3: comparing and distinguishing concepts correctly
- Indicator 5 (ability to apply concepts)

  Score 0: did not answer
  Score 1: able to apply a concept but not right
  Score 2: able to apply a concept but incomplete
  Score 3: able to apply a concept appropriately

C. Assessment of Learning Motivation

The students' learning motivation is seen from the results of the questionnaire with criteria: if the student answer yes given a score of 1, if answered is not given a score of 0 (consists of 10 statements), with the following evaluation interval:

Motivation scores: 0 - 3 low
Motivation scores: 4 - 6 enough
Motivation scores: 7-10 high

III. Result and Discussion

A. Score of Students' Learning Activity

Table 1 shows the score of students' learning activity:

TABLE I. Score of Students' Learning Activity

Observed Aspects	Cycle I			Cycle II		
	P-1	*P-2*	*P-3*	*P-1*	*P-2*	*P-3*
Students pay attention to lecturer directives	3	3	3	3	3	3
Students observe the picture presented by the lecturer	2	2	3	3	3	3
Students ask questions related to the image presented	1	2	2	2	3	3
Students collect data/information related to the image	2	2	2	3	3	3
Students make notes or descriptions of the images presented	2	2	2	2	3	2
Students behave in an orderly manner when dividing groups	3	3	3	3	3	3
Students discuss in groups	2	2	3	2	3	3
Students associate the results of data collection with pictures	2	2	2	2	2	3
Students communicate the results in group discussions	3	2	2	3	3	3
Students make the conclusions	2	2	2	3	3	3
Total score	**22**	**22**	**24**	**26**	**29**	**29**
Average of Activity Score	**22.67**			**28.00**		
Criteria	**Quite Active**			**Active**		

Table 1 shows the score of students' learning activity have increased significantly from quite active in the cycle I became active in cycle II. It seems that students have actively asked the questions related to the images presented, the students have been able to gather information related to the picture and have been good at making the conclusions.

B. Description of Students' Test Results

Table 2 shows the description of students' test result.

TABLE II. DESCRIPTION OF STUDENTS' TEST RESULTS

Students' Test Results	Cycle I	Cycle II
Minimum Score	61.15	69.32
Maximum Score	82.47	90.43
Variance	11.74	12.13
Average	**67.10**	**80.40**
Median	**69.15**	**79.32**
Classical Completeness	**71.90%**	**89.20%**

Table 2 shows that the average of students' test results have increased from the first cycle of 67.10 to 80.40 in the second cycle. The learning completeness also increased from 71.90% in the first cycle to 89.20% in the second cycle. This means that the application of ENE learning can improve the students' test results.

C. Scores of Students' Concept Understanding

Table 3 shows the scores of students' concept understanding:

TABLE III. SCORES OF STUDENTS' CONCEPT UNDERSTANDING

Indicator of Concept	CYCLE I		CYCLE II	
	Percentage (%)	*Category*	*Percentage (%)*	*Category*
Restate a concept	62.12	enough	74.15	high
Classifying objects according to certain characteristics based on the concepts studied	70, 45	high	75.68	high
Give examples and not examples of concept learned	72.17	high	80.97	high
Comparing and distinguishing the concepts	61.89	enough	79.42	high
Applying the concept	60.22	enough	78.65	high
Average of Concept Understanding	**65.37**	**enough**	**77.80**	**high**

Table 3 shows the average of students' concept understanding have increased in the second cycle with a high category. The indicators of concept understanding that are quite significant have increased, namely restating a concept, comparing and distinguishing concepts and applying the concepts.

D. The Score of Students' Learning Motivation

Table 4 shows the score of students' learning motivation:

TABLE IV. SCORE OF STUDENTS' LEARNING MOTIVATION

Score	Cycle I			Cycle II		
	Frequency	*Percentage (%)*	*Interpretation*	*Frequency*	*Percentage (%)*	*Interpretation*
0 - 3	0	0	low	0	0	low
4 - 6	8	20	enough	1	2.5	enough
7 - 10	32	80	high	39	97.5	high

Table 4 shows that the majority of students' learning motivation was high both in the first cycle and in the second cycle. Seen in the first cycle as many as 32 students (80%) had high learning motivation and in the second cycle, as many as 39 students (97.5%) had high learning motivation. None of the students had low learning motivation both in cycle I and cycle II.

E. Discussion

The results of the study show that the application of ENE learning can improve the learning activity, understanding of concept, learning outcome and fostering the students' learning motivation. This was in accordance with the results of the study [9, 10] which said that through ENE learning made trained students actively participate and improve the critical thinking skill. But the previous research was applied to social sciences and had never seen the aspects of students' learning motivation. In terms of motivation, it was very important to encourage the learning activity and improve the learning outcome.

The learning motivation of students was high with the application of ENE learning. Based on the questionnaire obtained data that students were interested in learning statistics by using the ENE learning method, were eager to reread the lesson that has been recorded, happy to complete the assignment given by the lecturer, feel disadvantaged if not participating in learning, hope that the ENE learning method is maintained in the class because the students were more easy to understand the concepts given through the images presented especially in statistical lesson that were previously difficult for them to understand.

The test results obtained were in the complete category supported by the students' concept understanding achieving high criteria in the last cycle. Students have been able to restate a concept such as nominal data definition, ordinal data. Able to distinguish various types of data and be able to apply to various cases of research examples that used statistical procedures. Students have also been able to distinguish independent sample groups and dependent sample groups, able to apply to various research cases.

The students' learning activity were in the active category, meaning they actively carry out activity during learning, such as observing images (Example and Non-Example), gathering information on images, analyzing the images, making the hypotheses, so as to be able to distinguish characteristics that appear in Example and Non-Example, dare to present their ideas in front of the class and be able to draw conclusions from the concepts presented. The following is illustration of ENE learning:

Example	Non Example
1. Number of students 40	1. Table length 2.1 m
2. Number of Tables 20	2. Height of 181 cm
3. Number of motors 15	3. Body weight 64.3 kg
4. Number of pages of books 146	4. Room temperature 20 ^{0}C
5. Number of Lecturers 25	5. Test score 98.5

Fig. 1. Illustration of examples and non-examples, ENE learning.

Figure 1 showed an illustration of ENE learning in data type lesson. Students were expected to be able to distinguish between discrete data and continuous data, in the example was an example of discrete data and in the non-example image was an example of continuous data. The students record what were the characteristics of the data, analyze it and then express their opinion. Thus ENE learning was able to improve the learning activity while fostering the learning motivation and improving the students' concept understanding.

IV. CONCLUSION

The application of the ENE learning method can increase the students' learning motivation and improve the concept understanding. The results of observation in the class showed that students were very active in discussing, and communicating analyzing concept presented in the form of drawings and diagrams and being able to think critically. The results of the questionnaire showed that their learning motivation was high, the majority of students said that learning was very interesting, fun and not stressful. The understanding of concept of material was also more improved and based on the test results have been completed.

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