



THE ANALYSIS OF INTUITION AND CHARACTER BASED ON MATHEMATICS LITERACY IN PROBLEM POSING MODELS

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ABSTRACT

The role of education is important to increase the human and nation quality life. The objectives of the study were learning quality that was obtained by process and result, intuition, and students' effort in their literacy ability. This study analyzed the intuition and the character based on Mathematics Literacy by problem posing model. Problem Posing in Junior High School was effective by achieving 75% of classical mastery, the mean literacy score of learning by Problem Posing was better than the mean literacy score of learning by expository, there was significance influence between affective and psychomotor aspect to cognitive aspect. Problem posing learning was good proved by the excellent of teachers' creativity in learning process. The students' activity was run well and the achievement of the students was increased in all learning aspects including cognitive, affective and psychomotor aspect. In understanding the problems of each subject, the researcher used afirmatori intuition directly in each question of mathematics literacy. All subjects done the cases by Anticipatory global character and mathematics skills in real (formula). It can be concluded that Problem Posing model increased the hard working character proved by the improvement of high and medium criteria for the high mathematics literacy subject, and low criteria for medium and low mathematics literacy subject. Therefore, the use of problem posing is needed in learning process

Key Word: Literacy Ability, Intuition, Character, Problem Posing

INTRODUCTION

The process of creating character cannot be separated with problem solving. According to Suherman (2003: 89) problem solving is an important part of mathematics curriculum because the students obtain experiences using their knowledge and creativity to be applied in solving the infrequent problems in learning process.

School mathematics curriculum stated the purpose of teaching mathematics; it is to make students be able to face situation change in the world that is always developed through doing exercises based on logical, rational, critical, accurate, honest, and effective thought.

In order to make students reach mathematics learning mastery standard, the teachers have to look for their partners collaboratively to increase the students' achievement by applying problem posing learning. In addition the roles of teachers are needed to educate their students. It is relevant with a study conducted by Hidayah (2013). It stated that problem posing was one of methods suggested by NTCM ((National Council of Teacher of Mathematics).

This study was inspired by some studies focused on problem solving and mathematics literacy. They are as follows: (1) based on study conducted by Abidin (2011), strategy used in planning problem solving was try and share strategy. (2) Munir (2012) stated that some logic intuitive models usually used by the students in doing mathematics cases were implicit (tacit), diagrammatic, analogy, and paradigmatic model. (3) Stacey (2012) asserted that one of mathematics processes based on PISA study was problem solving in real world. (4) According Hidayah (2013), problem posing was one of methods in learning mathematics suggested by NCTM (National Council of Teacher of Mathematics). (5) Sumarto (2013) stated that students' intuitive understanding could help them to solve ratio cases. (6) Chacon (2013) asserted that geometry application influenced students' affective aspect. It meant that geometry would influence students' character.

Based on the previous studies, the students were not familiar with mathematical problem solving and they did not remember about the formulas, they preferred to guess and try in doing mathematics cases. The purposes of this study were as followed: (1) to describe

learning quality by problem posing, (2) to describe intuition used by the students with high, medium, and low mathematics literacy, (3) to describe students' hard working character with high, medium, and low mathematics literacy.

Process component of PISA study was also meant as the students' steps in solving the problems. Process literacy was the ability to formulate, employ, and interpret of process component.

Mathematics literacy scoring design in PISA 2012 mentioned that process of literacy engaged seven important cases as followed. (1) Communication: mathematics literacy involved the ability of communicating the problems (2) Mathematizing: mathematics literacy involved the ability of transferring daily problems into mathematics cases or the opposite of it. (3) Representation: mathematics literacy involved the ability of restating of the problems. (4) Reasoning and Argument: mathematics literacy involved the logic literacy and giving reasons. (5) Devising Strategies for solving problems: mathematics literacy involved the literacy in using strategy to solve problems. (6) Using Symbolic, Formal and Technical Language and Operation: mathematics literacy involved the literacy in using symbolic, formal, and technical language. (7) Using Mathematics Tools: mathematics literacy involved the ability in using mathematics tools including measurements, operation, etc.

Context component in PISA study was a situation described in the case. There were four contexts that have been focused. They were: personal, occupational, social, and scientific context.

METHODS

Mix method or concurrent triangulation design is a research method that combines qualitative and quantitative method by mixing both of them in balanced (50% for qualitative and 50% quantitative method). Both methods are used together in the same time, but they independently answer the similar objective of the study. The population of this study was the eighth grade students of SMP Negeri 10 Semarang in the academic year of 2014/2015. The researcher selected four classes randomly, they were class VIII A as try-out class, class VIII B as post-test class, class VIII C as experimental group taught using problem posing, and class VIII D as control group taught using expository learning. There were several data collecting stages applied in this study as followed: pre-experimental stage, experimental stage, and data analysis stage. The researcher used

several techniques in collecting data; they were: observation, interview, test, documentation, and triangulation. The techniques in analyzing the data using normality test, homogeneity test, *t*-test, *z*-test, two samples *t*-test, and double regression test. A test item is valid if $r_{obtained} > r_{table}$. Based on the calculation of $r_{hitung} = 0,329$ and the table, so that the test item number 1 until 14 were valid except number 4. The reliability test gained $\alpha_{obtained} = 0,90934$, and $\alpha_{table} = 0,602$. It meant that the test item was reliable. The test items selected by considering the validity, reliability, difficulty level, and variant based on their criteria, therefore this study used 7 test items that relevant to the criteria and mathematics literacy; they were number 1, 3, 5, 8, 9, 11, and 14.

RESULT AND EXPLANATION

1. Learning Quality

Learning quality has several indicators, they are teachers' skill, students' activity, achievement, learning situation, learning materials and learning media (Depdiknas: 2004). This study had three components, they were teachers' skill, students' activity, and achievement. The followings were the explanation of that three components: (a) teachers' skill is teaching skill, the ability of the teachers to deliver information in developing students' ability in order to make the students have attitude and skill knowledge. (b) Students' activity is the activity done by the students in learning, therefore it lead the students' learning attitude change. (c) Achievement is the change of students' attitude they face after learning activity, this study showed that there is an improvement in affective, cognitive, and intuition aspect.

Z-test resulted $z_{obtained} = 2,384$. The critical value was 5%, so that $z_{table} = Z_{(0,5 - 0,05)} = Z_{0,45} = 1,64$. Therefore it could be concluded that students' proportion in mathematics learning using problem posing gained classical mastery of 75%.

The *t*-test resulted $t_{obtained} = 6,28$. The critical value was 5%, so that t_{table} was 1,67. Therefore it could be concluded the mean of students' mathematics literacy using problem posing was better than the mean of students' mathematics using expository.

Two samples *t*-test resulted $t_{obtained} = 4,83$, intuition was 7,28 dan character was 4,83 with critical value of 5%, so that t_{table} was 1,67. Therefore it could be inferred that the improvement of students' mathematics literacy mean using problem posing was better than the improvement of students' mathematics literacy using expository.

R square test resulted that $R\text{square} = 0,991 = 99,1\%$. The score showed that mathematics literacy could be explained by intuition and collaborative character 99,5%. It meant that there was 0,09 % of variable y influenced by the other cases out of problem solving intuition and hardworking character.

This model gave challenge to the students, therefore they would be satisfied because they found their new knowledge in themselves, made the students to be active in learning, and helped the students in learning how to transfer their knowledge into mathematics literacy case. The students used their knowledge to solve the problem because there was a relationship between its concept. According to Bruner, learning mathematics would be success if the teaching process is directed to the concepts and structures in main chapter, and the relationship between concepts and structures (Suherman, *et al.*, 2003:43).

Problem posing learning model has encouraged the students' ability in finding their new knowledge and delivering their knowledge to understand problem in their daily activities, especially when making questions. This case was relevant to a study conducted by Hudoyo (1988: 1) which stated that the students' achievement was an attitude change.

An interesting, challenging, and contextual case that measured students' mathematics literacy could inspire the students in developing their creative ideas both in individual and group to make mathematics question with varieties of complexity grade. This case was relevant to the statement of Hidayah (2013). She asserted that the results were obtained from the findings showed that problem posing model gave the opportunity of the students to develop their creativity through problem situation. This finding was also supported by Contreras (2013). It asserted that problem posing in learning would be interesting, and the students' would have new knowledge when they were solving the problems.

2. Intuition

Research Subject of High Mathematics Literacy

1. Luas permukaan kubus = $6s^2$
 $= 6 \times 15^2$
 $= 6 \times 225$
 $= 1350 \text{ cm} = 0,135 \text{ m}$

Jadi, luas permukaan kotak kalung tsb adalah $0,135 \text{ m}^2$

Figure 1. The answer of number 1 of high mathematics literacy

The subjects of high mathematics literacy in doing the question number 1 (interpret, mathematizing, social) using direct affirmative intuition to understand the problem, and anticipatory with mathematics logic in real to plan in problem solving, but the planning did not use intuition, in other case to recheck the answers used direct affirmative intuition. Research subject high mathematics literacy in doing exercises (interpret, devising strategies for solving problem, work) using direct affirmative to understand and do solving plan, in other case to plan and check the answer using affirmative intuition in the formula.

The subjects of high mathematics literacy in answering question (formulate, reasoning & argument, individual) using direct affirmative to understand the problem. This case was relevant with the opinion of Usodo (2012). He asserted that strategic thinking used would be better development if based on intuition than analysis.

Research Subject of Medium Mathematics Literacy

The subject of medium mathematics literacy in answering number 1 using direct intuition to understand the problems, and anticipatory with mathematics logic to plan the problem solving, but to do the planning, the subject rechecked the answer instead of using intuition.

2. Luas permukaan kubus = $6s^2$
 $= 6 \times 100^2$
 $= 6 \times 10.000$
 $= 60.000 \text{ cm}^2$
 $= 6 \text{ m}^2$

$6 \text{ m}^2 \times 5 = 30 \text{ m}^2 = 37,5 \text{ m}^2$
 $0,8 \text{ l}$
 $= 37,5 \text{ l}$

Figure 2. The answer of number 2 of medium mathematics literacy

The research subject of medium mathematics literacy in answering question using direct affirmative to understand the problem, using affirmative intuition and mathematics logic in planning problem solving, using affirmative when doing the planning, but did not use intuition in recheck the answers. The research subject of medium mathematics literacy in doing question number 3 using direct affirmative to understand and do the planning of problem solving. In other case, the subject used affirmative intuition with formula in planning and rechecking the answer.

Based on the written answer of interview, the answer of subject S3 was false. According to Stavy in Usodo (2012), the validity gained by intuition was not absolute.

Research Subject of Low Mathematics Literacy

Research subjects of low mathematics literacy in answering question using direct affirmative intuition to understand the problems. According to Fischbein (1999) direct cognition, self-evident cognition was cognition received as individual feeling without further checked and proved. Research subjects of low mathematics literacy planned problem solving using anticipatory with real mathematics logic. In other case, to do the planning, the research subjects of low mathematics literacy did not use intuition. They used direct affirmative intuition to recheck the answer.

3. Hard-working character

The participation of S1 in starting the learning activity was good. It was increased in every learning process, proved by being on time doing the assignment. When doing the assignment, S2 also being on time. It seen by the assignments of hand-book and students' book were always done on time. Hand-book and students' book that related to daily activity made the students comfort. This case was relevant to the statement of Tugrul (2010). He asserted that unsuitable book made the teachers difficult in problem posing learning, and the students did not enjoy because they did not face experience as their daily activities.

S1 and S2 were often presenting their homework by their own language clearly. It seen in second and third meeting. S1 made important report in every learning activity neatly in his report book, so did S2 but his report was not neat. They chose media correctly proved by preparing props in learning process. S1 brought a wood representing beams. S2 brought eraser representing beams. S3 brought prop in second meeting but she did not in third meeting. S4 brought prop in the third meeting. S5 brought props in the fourth meeting. However, S6 never brought prop because his friend has already brought it.

By administering problem posing model, it was known that the hard-working character in every subject was increased. It caused by the higher step needed the higher effort. According to Haji (2011), problem posing could sharpen the question understanding and engraft the variation of answering question, and it could activate students in learning activity.

CONCLUSION

1. There were learning qualities by problem posing as followed: (a) teachers' skill in learning using Problem Posing was good. (b) Students' activities according to Dierich (in Sardiman, 2011) were good. They consisted of Visual Activities, Oral

Activities, Listening Activities, Writing Activities, Drawing Activities, Motor Activities, Mental Activities, Emotional Activities. (c) Achievement showed the improvement of all aspects including cognitive, affective, and *psychomotoric* aspect.

2. The intuitions students used were: (a) the students used direct affirmative intuition in understanding mathematics literacy problem. (b) all subjects used global anticipatory and formula in doing all questions. (c) the research subject of high and medium mathematic literacy doing cases using direct affirmative intuition. (d) in rechecking the answers, all of the research subjects using direct affirmative.
3. By administering problem posing model, it could be seen that students' hard-working characters were increased proved by (a) students' hard-working character was increased with high and medium criteria improvement for the subjects of high mathematics literacy. (b) students' hard-working character was increased with low criteria improvement for the subjects of medium mathematics literacy. (c) students' hard-working character was increased with medium criteria improvement for the subjects of low mathematics literacy

SUGGESTION

Problem Posing could be used in mathematics learning, and the exercises on every chapter is used to make the equality of mathematics literacy using PISA. It is necessary to be familiar with problem solving using steps including Polya.

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