

Character Development In Mathematics Problem-Based Learning

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Abstract

Concept of learning is an active process to construct meaning as the result relating new ideas on the previous understanding. Therefore, learning mathematics in the classroom is a process to build a deep understanding by the students through activities designed by teacher. Teacher-designed activities in learning are not only to developing means but also to developing student's character that will be used for the provision of social life. Therefore education is required not only to build an understanding to students, but also must be able to perform his role and function to inculcate moral values and character. Then, the purpose of education is really a human being who has the knowledge and personality fit with the character of the Indonesian nation. Mathematics Problem based learning could be the way to reach those purposes. The results of this research are (1) problem-based learning can be used as a means to build character behavior and social skills students at the junior high school, (2) Character behavior and social skills that can be built include trustworthy, respect, individual accountability, social responsibility, concern, questioning skills, gives an idea or opinion, being a good listener and cooperation.

Key words: Mathematics problem-based learning, Nation character

A. INTRODUCTION

A.1 Background

The focus of mathematics learning is how students can learn mathematics effectively. The view of learning mathematics; as a dynamic, constructed, and reconstructed; has made learning mathematics showing as a human activity. So, in learning mathematics should give the opportunity to student applying mathematics as significantly through re-invention or re-construction of ideas and concepts. This activity requires students to present and to communicate mathematical ideas, interpret mathematics representations to others, making connections between ideas, use reasoning skills, and solve problems.

With that basis, the learning of mathematics should be packed into the process of constructing rather than receiving knowledge. The process of learning mathematics is desirable students to construct their own knowledge through active involvement in the learning process (Labinowicz, 1985; Confrey, 1994). One of the learning approaches based on the views of constructivism is problem-based learning (PBL). According to Savery and Duffy (1996), PBL is based on the assumption that: 1) understanding arises

through interaction with the environment, 2) cognitive conflict is a stimulus to understand and determine the organization and the nature of the study and this cognitive conflict should always strived occur in learning; 3) developing knowledge should be through social interaction and negotiation.

Problem-based learning provides a learning environment with a problem that is being the basis of learning, which means that learning begins with contextual problems to be solved. Issues rise so that students need to interpret the problem, collect the necessary information, evaluate alternative solutions, and presenting solutions. To that end, students are expected to formulate the problem to be a mathematical situation, which includes a procedure that is not routine or that are not well structured. Then, students can gather information related to the problem, making conjectures, and generalize mathematical concepts and procedures. In addition, students are expected to make connections between mathematical ideas in a way to solve the problem in various ways completion (Erickson, 1999). When students develop a method to construct a procedure, they integrate the knowledge of the concept with the skills they have. Therefore, overall the students who construct their knowledge and the teacher as a facilitator.

As a facilitator, teacher should develop students' awareness about what to be done in learning mathematics and encouraged to learn actively and directly involved in learning, to construct their own knowledge, and to find themselves and not only memorize. To stimulate student's interest, teacher should guide student to think and to develop their confidence in analyzing and solving problems. With the interaction among them, the ability of the students will be developing. Students will learn from other, because when they are discussing the subject matter, cognitive conflicts will arise and reasoning that is not appropriate will be seen, understanding that quality will be formed as well. Thus, PBL creates a supportive atmosphere so that students can develop characters such as: trustworthy, respect, individual responsibility, social responsibility, fair, and caring, as well as social skills including giving an idea or opinion, be a good listener, and abilities to work together.

A.2 Problem Formulation

Referring to the above background, the issues that examined in this study is: "What qualities of student's character behavior and social skills that is formed in PBL in terms of school-rank (high, middle)?"

A.3 Objectives and Benefits of Research

Based on the formulation of the problem above, the purpose of this study was to describe the quality of student's character behavior and social skills who follow the PBL in terms of ranking schools (high, medium). With this objective is expected to be generated by a mathematical description of the learning model as a means to build the character of the nation in junior high school students.

RESEARCH METHOD

B.1 Research Design

This study is an experiment on the applying problem-based learning (PBL). The research design is a group posttest only design that can be presented below (Ruseffendi, 2005).

X O (read: treatment continuing with posttest)

Description:

X = treatment by PBL

O = self-assessment of the character's behavior and social skills

The independent variable in this study is PBL treatment, while the dependent variable is the character's behavior and social skills are built. The population is all junior high school students in Bandar Lampung City. Sample is taken in a stratified purposive sampling to select one high-rank schools and one middle-rank school, while the class of samples taken at random. From high-rank schools, the sample subjects were students of SMPN 4 Bandar Lampung and from middle-rank school, the sample subjects were students of SMPN 12 Bandar Lampung. Distribution of samples can be seen in Table 1.

Table 1. Research Sample Based on School-rank

School-rank	School	Subject Group	Sample size
High	SMPN 4	Class IX B	32
Middle	SMPN 12	Class IX As	33
Totally			65

B.2 Materials Research

B.2.1 Mathematics Problem-Based Learning

In learning, students need to be known that the knowlegde should be constructed by theirselves and then to transform it more complex situations to the others so that

knowledge will become the property of students. The process of constructing their own knowledge can be done by the students based on experience that has been previously owned, and can also be a result of the discovery that involves the environment as a factor in the process of acquiring knowledge.

Steps of PBL in this study are as follows.

- a. The teacher explains the lesson to be applied, the tasks to be done, and assessment will be used.
- b. Students are divided into groups (4-5 people)
- c. Each group is given a problem in the Student Worksheet (SW). In each group, students organize ideas and knowledge they have, related to the problem.
- d. In the discussion groups, students ask questions related to the problem. Students are given the opportunity to declare that they understand and do not. Teacher pays attention to the discussion and may provide clues, if necessary.
- e. In class discussion, students integrate new knowledge into the context of the problem. The teacher reminds students to reflect what they have obtained.
- f. Some groups present the result of discussion by accompany with questions and answers.
- g. Teachers and students summarize the day's meeting materials, and provide group tasks and individuals

B.2.2 Nation Character Development

Law No. 20 of 2003 on National Education System in Article 3, states that the national education serves to develop skills and form the character and civilization of the nation's dignity in the framework of the nation's intellectual life. In the context of the life of society, nation and the state of Indonesia, it is believed that values and character that is defined as the function and purpose of national education, students must possess to be able to face the challenges of life in the present and future. Therefore the development of values that lead to the formation of national character acquired through various channels, levels and types of education encourage them to become members of the public who have a superior personality as expected in the national education goals.

In academics, character education interpreted as values education, character education, moral education, character education, which aim to develop the ability of learners to provide good-bad decisions, maintaining what is good, and realize the goodness in everyday life with a vengeance liver. Therefore the charge of psychological character education includes the moral dimension of reasoning, moral feeling, and moral behavior (Lickona: 1991).

Until now, the curricular has made various efforts to make education more meaningful for individuals who not only give knowledge on cognitive level, but also touched the level of affective through several subjects. Nevertheless it must be admitted because the conditions are changing rapidly day, then the efforts it is still not able to accommodate a dynamic character development and adaptive to change. Therefore, character education need to be repackaged in a container that is more comprehensive and more meaningful. Character education need to be operationalized in school life through learning to do.

In Permendiknas No.23/2006 on Standards of Competence Graduates SMP implicitly or explicitly already contained the substance of values/character in the formulation. The substance of values/characters that exist in every SKL were: (1) religious (2) honesty, (3) tolerance, (4) disciplines, (5) work hard (6) creative, (7) independent, (8) democratic; (9) want to know; (10) the spirit of Nationality; (11) love homeland; (12) Respect the work and achievements of others; (13) friendly/communicative; (14) love peace; (15) joy of reading; (16) care and social environment; (17) responsibility. These characters are expected to be built in the PBL.

B.3 Procedure

The research was conducted in two phases of activities, namely (1) preparation phase: assessment of the characteristics of junior high school students, junior high school mathematics curriculum, learning theories and models of problem-based learning, learning material, students' self-assessment instruments and pieces of the observation, (2) experimental phase: implementation of problem-based learning on subject of space (cube, block, pyramid, and prism), disseminate student assessment instruments and observation to determine the character's behavior and social skills.

B.4 Instruments

The data of the character's behavior and social skills acquired by each of two meetings, students fill out self-assessment questionnaire and the teachers observe during the implementation of learning. Instruments used to collect data about character's behavior and social skills are building within the PBL is a self-assessment questionnaire completed by students and observation sheets completed by the teacher. Student self-assessment questionnaires and observation sheet consists of 5 points, character behavior indicators are (1) trustworthy, (2) respect, (3) individual accountability, (4) social responsibility, and (5) concern. While the 4-point indicators of social skills are (1) questioning skills, (2) provide ideas or opinions, (3) being a good listener and (4) cooperation.

B.5 Data Analysis Techniques

Analysis of data about the character's behavior and social skills practiced by calculating the percentage of each character's behavior and social skills are achieved.

C. DISCUSSION

Analysis of student self-assessment questionnaire about the character's behavior and social skills in the PBL, obtained the following data. Data about the character's behavior seen in Table 2. The data about social skills seen in Table 3.

Table 2. Achieved of Character’s Behavior Indicator

No	Indicator	School-rank					
		High			Middle		
		achieved Score	Total Score	Achieved (%)	achieved Score	Total Score	Achieved (%)
1	Trustworthy	108	128	84,38	92	132	69,70
2	Respect	144	192	75	126	198	63,64
3	Individual responsibility	112	128	87,5	96	132	72,73
4	social responsibility	104	128	81,25	112	132	84,85
5	Concern	100	160	62,5	100	165	60,61
Average (%)		78,13			70,31		

Table 2 show that the average achievement of the character's behavior indicators of high-rank school is equal to 78.13% and the middle-rank school is equal to 70.31%.

Generally, the character's behavior indicators show the percentage of achievement has been characterized by considerable (more than 60%). Indicators are best achieved in high-rank school is the responsibility of individuals, while the student of middle-rank school is social responsibility. Based on the observations of learning is seen that some of the characters began to appear even some of the indicators are already apparent, such as individual and social responsibility. However, further efforts need to be entrenched behavior of this character.

Table 3 shows that the average achievement of the indicators of social skills of students in high-rank school is equal to 82.81% and the middle- rank school is equal to 79.54%. Generally, the social skill indicators show the percentage of achievement has been characterized by considerable (more than 60%). The best achieved of students social skill indicator is cooperation, while the lowest indicators are achieved by students is questioning skills. Based on the observations of learning shows that some indicators of social skills has begun to appear even there are some indicators that are visible such as the ability to cooperate. However, further efforts need to be entrenched behavior of this character.

Table 3. Achieved of Social Skills Indicator

No	Indicator	School-rank					
		High			Middle		
		achieved Score	Total Score	achieved (%)	achieved Score	Total Score	achieved (%)
1	questioning skills	24	32	75	20	33	60,61
2	provide ideas or opinions	25	32	78,13	29	33	87,88
3	being a good listener	28	32	87,5	26	33	78,79
4	cooperation	29	32	90,63	30	33	90,91
Average (%)		82,81			79,54		

D. CONCLUSIONS AND SUGGESTIONS

D.1 Conclusions

Based on the description above, the following conclusions can be obtained.

1. Problem-based learning can be used as a means to build character's behavior and social skills at the junior high students.
2. Character behavior and social skills that can be built include: (1) trustworthy, (2) respect, (3) individual accountability, (4) social responsibility, (5) concern, (6) questioning skills, (7) gives an idea or opinion, (8) being a good listener and (9) cooperation.
3. The quality of student character behavior and social skill that built in PBL in terms of ranking schools (high, medium) is relatively similar. In case this is still considered insufficient.

D.2 Suggestions

Suggestions can be submitted are as follows:

1. Learning mathematics with PBL, alternative options should be teachers in junior high school, especially as a means to develop character's behaviors and social skills.
2. Further efforts need to be characterized by behavioral and social skills have been established can be entrenched among junior high students.

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