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Developing National Character Through Mathematics Instruction Via Mathematics Instruction With Problem-Based Learning In Jigsaw Typed Cooperative Setting

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Abstract

National character which is the goal of national education is the intelligent character based on the value of faith, piousness, and noble qualities. Mathematics instruction oriented towards the development of learners' potential most strategically contributes to the accomplishment of the goal. One of learning alternatives which can develop national character is mathematics instruction with problem based learning (PBL) in Jigsaw typed cooperative setting.

Key words: problem-based, Jigsaw, character

I. INTRODUCTION

The current condition in the field in general and mathematics instruction in particular does not involve students' activities optimally. This is confirmed by Sumarmo's studies (1993, 1994) of students of high school , and of secondary school and teachers in the city of Bandung. The findings indicate, among others, that mathematics instruction does not involve students' activities so optimally that the students do not learn actively. Sumarno's findings are supported by Sutrisno's (2000: 15) revealing that in practice students are not active in responding to the instruction. Studens tend only to receive the transfer of knowledge from teachers, amd also teachers in the teaching-learning process merely convey knowledge information without involving students in the active and generative process. According to Darr and Fisher (Ratnaningsih, 2007: 15), if students are expected to be independent, they need to be active and to be faced with the challenges which enable them to think, observe, and appreciate other people's opinion.

Besides that, recently un educative phenomena have emerged massively, such as corruption, violence, sexual crime, vandalism, mass fighting, wasteful economic life, unproductive political life, and son on. These phenomena are great and strong challenges for education world. Therefore, developing national culture and character is inevitable.

One of the ways to overcome the problems above is by implementing the mathematics instruction through problem-based learning (PBL) in the Jigsaw typed cooperative setting. The reason why this type of learning is chosen is that by exposing contextual problems at the outset of instruction is one of the stimuli and encourages students think. Under these conditions, a course of actions is a means to an end. Such instructions can facilitate students to explore, investigate, and solve problems. Sabandar (2005: 2) states that problem-solving situation is one of the stages when faced with the problem, the students are unable to find the solution to it immediately, even in the problem-solving process they may experience dead ends. At the time there is cognitive dissonance which may trigger mathematical high-ordered thinking. This may enable students to be more patient, diligent and become Indonesian people who are persevering in solving the problem.

The other reason is that through problem based learning in the Jigsaw typed cooperative setting, learners also learn how to be responsible in the learning activities, not only as the passive recipients of information, but they must find the necessary information according to their capacity. In such an instruction, students are required to be skilled in asking questions and expressing their opinion, finding the relevant informatiom from the hidden sources, seeking a variety of ways to find solutions, and determing the most effective way to solve problems. Under such problem-solving situation, it is possible for students to experience dead ends so that it compels them to review the thinking style they use. Thus, it is evident that through the problem-based learning, students are conditioned to be capable of thinking flexibly, proposing a conjecture and justifying it, overcoming the problem, and finding the general rules. Those are the characteristics of national characters to be developed through education.

In PBM in the Jigsaw typed cooperative setting, students are encouraged to be involved actively in the teaching-learning process so that it produces a positive impact on students' ability in understanding concepts. This is in line wih Hudoyo's view (1979: 109) stating, "If students involve themselves actively in finding the basic principle, they will understand the concepts better, recall longer, and be able to use them in another context."

II. DISCUSSION (EXPLANATION)

1. Concept of National Culture and Character Education

According to the ordinance of no 20, 2003, article 3 regarding National Education System, national education aims to develop learners' potential in order to be believers, and people who fear God, the One and Only, have good characters, are healthy, knowledgeable, capable, creative, independent, and become democratic and responsible citizens. The development of learners' potential includes individual, collective level, and for the sake of national existence.

In the book entitled *Pengembangan Pendidikan Budaya dan Karakter Bangsa* (Pusat Kurikulum, 2010), it is stated that education is conscious and systematic effort of culture and character. Culture is value, morality, norm, belief, and mind practiced by a society or a nation and underlying behaviors of an individual as his/her own self, a member of society, and of a nation. Culture governs an individual's behavior about something which is considered to be true, good, and beautiful. Character is disposition, nature, moral or personality which is believed and used as foundation of viewing, thinking, having a certain attitude, and behaving. Benevolence comprise a set of values, moralities, and norms underlying a person's point of view, mind, attitude, and behavior and distinguishing him/her from another. National character materializes through individuals' character as members of the national society.

Furthermore, the book defines national culture and character education as the education which develops students' national value and character in such a way that it becomes a foundation of thinking, attitude, and behavior in developing themselves as individuals, members of society, and of citizens. Cultural values and national character practised by learners make them as Indonesian citizens with their characteristics different from other nations. There are a lot of cultural values and national characters which can be integrated into instruction or education at school. The values are 1) religious, 2) honest, 3) tolerant, 4) disciplined, 5) hardworking, 6) creative, 7) independent, 8) democratic, 9) curious, 10) nationalistic, 11) patriotic, 12) achievement-oriented, 13) friendly/communicative , 14) peace-loving, 15) keen reading, 16) environment caring, 17) social caring, and 18) responsible.

2. Problem Based Learning (PBL)

Problem Based Learning (PBL) originating from Britain is a learning approach which begins with problem-solving, but to solve problems, learners need new

knowledge to solve them. Gijasealers (Pasek, 2009: 5) says that PBL derives from the learning theories stating that learning is a student's active knowledge construction. Furthermore, Moffit (Ratnaningsih, 2007: 3) states that PBL is a learning approach which involves students' activities optimally, enabling them to explore, observe, experiment, investigate, and solve problems which integrate basic skills and concepts from a variety of content areas.

PBL involves students in the active, collaborative, student-centered learning, developing problem-solving and independent learning ability needed to confront the challenges in life and career, in the increasingly more complex environment nowadays.

3. Jigsaw typed Cooperative Learning Model

One of cooperative learning models is Jigsaw model which was applied for the first time by Aronson in 1977 and was published in 1978, then adapted by Slavin and his colleagues in the University of John Hopkins (Slavin, 1995). In this jigsaw cooperative learning model, students learn in small groups which consist of 4-6 heterogeneous students who cooperate, depend positively on one another, and independent accountability. Every member of a group is responsible to other members of group in conveying the material and in solving the problem he finds. Moreover, students cooperate with other members of the group from both the origin group and the expert group in the cooperative atmosphere and have a lot of opportunity to obtain information they need.

The steps in implementing the jigsaw typed cooperative learning model are as follows:

(a) First, forming small group which are heterogeneous in their ability, gender, economic status, and ethnic background. Each group consists of 4-6 students. The initial formation of groups is called the origin group. The groups should be formed by a teacher to make the learning run effectively.

(b) Second, each member of group is assigned to solve a specific problem from the subject matter they learn. Then the students who have the same problems from other groups get together to investigate, expose, or construct the questions/problems, explore, investigate, and propose hypotheses, which finally solutions to the problems are found. The forming of these groups is called expert groups.

(c) Third, after the solutions to the problem assigned are found in the expert groups, each student from the experts groups return to their origin groups. Afterwards each member is responsible to explain mutually to other members of their group so that the students in their group can understand and solve the problems assigned.

(d) Fourth, a test/quiz is administered to the students to evaluate individually the learning process of the entire material, the scores obtained by each student are accumulated to the group scores.

(e) Fifth, the reward given to the group(s) which is/are obtained from the the accumulation of individual scores. The team reward is gained if the team(s) reach(es) the scores above the criteria determined. Besides the group scores, the group success is based on the individual performance as members of a group in establishing the interpersonal relationship which mutually support, help, and care.

To the clear, in the author present the steps of learning by using problem-based of jigsaw cooperative setting cooperative setting as follow

Opening Activity

Phase 1: Organize students to learn

1) The teacher motivates students to inform the learning model to be used, stressed that cooperation with members of the group is very concerned, and the link between the rule of filling the space provided with daily life
2) Teachers do apperception which aims to explore the basic skills of students through the questions raised by teachers about the prior knowledge (prerequisite material that has to do with the rules of filling the space provided.
3) Teachers distribute worksheets / teaching materials is the main source for group discussion.
4) In the home group, students were asked to read each and are expected to already have a better understanding of which will be brought to the expert group discussions.

b.Core Activities

Phase 2: Students solve problems

5) After receiving LKS / Teaching materials, the representatives of groups from hanging out

with other friends who have a similar task to the experts.

6) In this expert group, students discuss to resolve the issue. (Students are allowed to solve

their own problems by way of the consensus group members. During the discussions, the

teacher around to monitor the work of each group of experts, and engage students in difficulty.

7) lead students through scaffolding techniques to solve the problem.

Phase 3: Develop, present, analyze and evaluate the results

8) After a discussion in the group of experts, representatives of each return to the origin.

9) The teacher asks the representative to present the results of their discussion to the group of experts, while other members are there in the original group responded (sharing). Teachers act as facilitators.

10) The teacher helps students to reflect or evaluate solutions to problems.

11) The Teachers explain again briefly about the rules of charging points and permutation then guide students to summarize material

Phase 4: Providing Individual Training

12) Armed with the knowledge already gained in the group discussions, students work problems that exist in LKS (individual task) for 30 minutes.

13) Once the students are working, proceed with the examination results, by way of exchange work bench with a friend and teacher to give an answer key.

14) The results were recorded by the teacher for gift giving.

Post Activity

15) Teachers together with students to reflect on the process and results to learn about some things that need attention and reinforcement.

16) The teacher gives the questions to do at home

3. Building National Character through Mathematics Instruction with Problem-Based Learning in the Jigsaw Typed Cooperative Setting

Before discussing mathematics instruction through Problem-Based Learning in the Jigsaw Typed Cooperative Setting in relation with national character building, it would be better for us to understand the characteristics of Problem Based Learning Model seen from the presenting model of learning material, the profound study of learning material , teacher intervention, and class interaction. The description of the different characterestics above can be known in table 1.

Table 1
Characteristics of Problem-Based Learning
in the Jigsaw Typed Cooperative Setting

JPB Approach
The learning material is prepared in the form of problems so that the concepts, procedures, and principles in mathematics amastered by students are carried out through indirect learning (such as discovery-inquiry, problem-solving, pattern exploration)
Profound study of the material conducted through planned discussion in small groups of 5 students so that the students who become representatives in the expert group have a duty to explain to their friends from their origin group
Teacher intervention model developed in this model is less direct through scaffolding techniques such as question-raising, hint providing, and different problem proposing. However, the teacher intervention model in this approach is limited because when students face the problem, they discuss it either in the origin group or in the expert group.
Interaction model developed in this approach is in multiple direction in small group discussion which is planned and constantly conducted.

The factors causing the learning through PBL in the Jigsaw typed cooperative setting (JPB) are predicted to succesfully build national character, among others:

a. Seen from the learning material presentation

The learning materiah which is presented in the form of problems enables the students to have a chance of developing a concept, a procedure, and a principle in mathematics through varied learning activities including individual, group, and class activities. Every activity developed begins with problem presentation which serves as a stimulus and triggers students' thinking. It means that a problem acts as a means

to an end in learning. Such a learning concept can facilitate students explore, investigate and solve the problems. As with Sabandar (2005: 2) state that problem-solving situation is a stage when an individual is faced with a problem, he is not able to find the solution immidiately, even in the problem-solving process he/she still fids the dead ends. At the time there is a cognitive dissonance which may encourage students to think in mathematical high order. With such presentation of learning material, studentas are expected to have the qualities :

1) Independent, attitude and behaviour which does not easily depend on other people in completig the tasks.
2) Honest, the behaviour which is based on effort to make oneself as a person who is always trustworthy in words, actions, and work.
3) Hardworking, the behaviour showing serious effort in learning and doing tasks, as well as completing tasks as well as possible.
4) Creative, thinking and doing something to produce new ways or results from something that he/she has possesed.
5) Achievement appreciative, attitude and behavior which encourages oneself to produce something useful to society, recognise, and appreciate another person's achievement.
6) Keen reading, the habit which allocates time to read a variety of readers which benefit him/her
7) Curious, attitude and behaviour which always tries to know more intensively and extensively from something he/she learns, sees, and listen to.

b. Profound Learning of the Material

Profound learning of the material used in PBL in Jigsaw typed cooperative setting is carried out in the small group which is well prepared. This is the factor which encourages the constructive mental activity in forming the new mental objects. One of the foundations which can be used to achieve the goal is the theory of Zone of Proximal Development (ZPD) from Vygotsky. According to Vygotsky, learning can arouse a variety of stored mental processes which can be operated when a person interacts with his/her peers. Vygotsky believes that higher mental function are absorbed into the individual. The potential development which is acquired through the process of self-

study when solving the problem is called *actual development,* while the development which occurs as a result of iteraction with his/her peers who have higher ability is called *potencial development*. Zone of Proximal Development is the distance between *actual development* and *potencial development*.

Through student interaction, it is expected that there is an exchange of different learning experiences so that mental actions keep going on as expected. Meanwhile the scaffolding techniques can be used not only to direct the thinking process, but also to provide the further challenges so that mental actions expected can occur well. With the continual cooperation, it is expected to shorten the students' gap in their actual ability.

With the prepared and programmed discussion in the Jigsaw typed cooperative form which compels every student to be the representative of the discussion in the expert group to explain again to the member of another group, so every member of the group prepares him/herself with the good mastery of the cocept. This is a reflection of mental actions carried out by the students during discussion and cooperation with their friends. This activity can be seen from the students' ability in discussing ad explaining the result from the mental actions related with the cognitve.

During the origin group discussion, teacher can do iterventions indirectly by asking the students to explain their performance in solving the problem. Through this intervention, the students are directed to have ability in reflecting a number of mental processes which have been done until they can summarize them into the new mental objects. This is not found either in Problem Base Approach or in conventonal approach. With the profound learning of the material through discussion, the students are expected to have the following attitudes :

1) Tolerant, attitude and behavior which appreciates different religions, ethnic groups, opinions, attitudes, and actions
2) Democratic, mindset, attitude and actions which judges their rights and obligations with others' equally.
3) Nationalistic, midset, actions, and vision which places the national and country interst over their personal and group interest .
4) Patriotic, mindset, attitude, behaviour which idicates high loyalty, care, and appreciation to the national language, physical, social, cultural, econonomic and political environment.

5) Friendly, actions indicating a keen sense of talking, socializing, and working with other people.
6) Peace-loving, attitude, words, and actions which cause other people to feel happy and comfortable.
7) Social caring, attitude, and actions which always want to help other people and society who are needy
8) Responsible, attitude and behaviour to execute his/her duty and obligation which he/she should do to him/herself, society, (natural, social and cultural) environment, country and God, the One and Only.

This is supported by the results of research Sugandi (2010) which states that the problem-based learning by Jigsaw type setting Cooperative learning can enhance students' selfreliance with the following (1) Learning Initiative, 2). Diagnose learning needs, 3) Establishing Learning Targets and Objectives, 4) Monitor, Manage and Control, 5) Seeing difficulties as challenges, 6) Utilize and Finding relevant sources, 7) Choosing and Implementing a Learning Strategy, 8) Evaluating the Process and Results learning and 9) self eficacy (self-concept)

III. CONCLUSION AND SUGGESTION

Based on the discussion above, the writer has the following conclusions:

Mathematics instruction through Problem Based Learning in the Jigsaw typed cooperative setting is predicted to successfully build national character. This is supported by the characteristic problem-based learning with jigsaw cooperative settings, including learning begins with the presentation of the problem and in the process of solving the problem of students discussing with each other, complementary expression and weaknesses of each. Characteristic is what will encourage the emergence of characters desired Indonesian nation. In the implemetaion of the mathematics instruction through Problem Based Learning in the Jigsaw typed cooperative setting in bulding the national character, setting a good example is needed,

In addition, based on the conclusions above the writer offers the following suggestions:

1) Students' success in completing their education in the education unit should be more balanced between cognitive aspect, affective aspect, and psychomotoric

aspect.

2) Mathematics instruction which is "value-dry" can be developed by mathematics teachers by integrating and/or emphasizing the importance of positive values from the national culture and character in the learning activities.

IV. BIBLIOGRAPHY

Asep Ikin Sugandi, born in Bandung on 16th May 1968, his final education is a doctorate in education (S-3) from the study program of Mathematics Education in Indonesia University of Education (UPI) Bandung and is currently a permanent lecturer of the private university coordinator (Kopertis) of region IV Bandung and Banten and employed in STKIP (teachers' college and school of pedagogy) Siliwangi Bandung.

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