

THE INFLUENCE OF APPLYING PROBLEM BASED LEARNING BASED ON SOFT SKILL TO INCREASE STUDENTS' CREATIVITY IN THE SUBJECT DEVELOPMENT OF HIGH SCHOOL MATHEMATICS CURRICULUM

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Abstract

The objective of this research was to find out the influence of applying problem based learning based on soft skills toward increasing students' creativity in the subject Development of High School Mathematics Curriculum (DHSMC). The method used in this research was Pre-experimental method with the Intec-group comparison design. It was applied to the students who took DHSMC subject in the even semester of the year 2013/2014 for two classes. There were 28 students in the experimental class, who treated by using Problem Based Learning on Based Soft Skills and 25 students in the control group which were taught by using Problem Based Learning. The data of students' creativity was collected by using questionnaires by Likert Scale, observation, and interview. The aspects of creativity involved flexibility, originality, elaboration, and fluency. The data obtained was normal distributed and has homogen variance. As a result, the data was analyzed through the comparative independent sample that was t-test. The result of the research showed that there was not influence on students' creativities after teaching by problem based learning based on soft skills and those by problem based learning in taking DHCMC subject.

Key words: soft skills, problem based learning, creativity

BACKGROUND

DHCMC subject is a compulsory subject in Mathematics Education Program, Faculty of Teacher Training and Education, Riau University. The students are recommended to take it in the fourth semester. By taking this subject, the students are expected to understand the development of mathematics curriculum in Indonesia. Besides, the students have to know the curriculum 2013 that has been applied since the year of 2013/2014 especially for mathematics subject in the high school. This subject is a prerequisite for the next subject related to learning mathematics handling.

The material of subject involve: 1) the essence of curriculum developing (definition, role, and the function of curriculum; curriculum and learning; the teacher's role in curriculum development); 2) curriculum development of mathematics in Indonesia; 3) the basic concept of developing curriculum 2013 for mathematics in high school; 4) study the base of law of curriculum 2013 that are shown in the rule of National Education Ministry about competence standard (SKL), core competence (KI),

basic competence (KD), teacher's book and the students' book; 5) inter relation of SKL, KI, and KD; 6) instructional design.

The study of each material asked the students to reach the information from many sources. The students were given the tasks which needed to be discussed in group, and the result was made in the form of paper and the material of presentation, and communicated in the class discussion. These activities were expected to be able to build the students' creativities in the learning process. The lecturer actively facilitated class discussion in order to bring the students to achieve the competences proposed in the contract.

Based on the observation toward the students' participating in learning process it showed that the students' creativity was still low nowadays. They rarely arouse creative ideas in the learning process. Most of them were passively participated such as doing only what the lecturer asked to do without any spirit to create interesting things in handling the discussion. Especially in the first and the second meeting of DHSMC subject those were done by using the lecture and question-answer method of teaching. In this case, the students rarely showed the creativity like asking the questions, telling the ideas, and arising creative ideas.

The students had to be able to follow the learning process with high eager to learn, critically, and creatively. Furthermore, their understanding of high school curriculum could be achieved as the proposed objective. The lecturers needed to give challenges in order to activate the students in the learning process. In addition, the students' soft skills should be integrated in the learning process. The result of a research (Murni, 2014) stated that the profiles of Math Study Program Students' soft skills consist of responsibility, cooperation, and self-confidence were in enough category. As a result, in order to balance the students' hard skills and their soft skills, it was needed the integrating and empowering soft skills in handling learning activity.

Both group discussion and class discussion needed soft skills establishment. Soft skills is a series of skills that influence someone to interact each other. Ayu (2011) stated that soft skills can influence someone to perform himself better, such good attitude, higher self confidence, be able to appreciate himself and others, good control of emotion and behavior. In conclusion, soft skills are very important in someone's life to build better personality.

Soft skills can be categorized into two, intrapersonal and interpersonal skill. Intrapersonal skill is someone's skill to manage himself, and interpersonal skill is someone's skill that is needed to have relationship with others (Mu'addap, 2010). Intrapersonal skill should be straightened before having relationship with others.

Intrapersonal skill including: (1) self awareness, which consists of: (a) self confidence, (b) self assessment, (c) trait & preference, and (d) emotional awareness; (2) self skill including: (a) improvement, (b) self control, (c) trust, (d) worthiness, (e) time/source management, (f) proactivity, and (g) conscience.

Interpersonal skill including: (1) social awareness, which consist of: (a) political awareness, (b) developing others, (c) leveraging diversity, (d) service orientation, (e) empathy; (2) social skill, consists of: (a) leadership, (b) influence, (c) communication, (d) conflict management, (e) team work, and (f) synergy.

Rosilawati (2009) stated that soft skills consist of effective communication, creative and critical thinking, build team, and other abilities related to the capacity of individual personality. Moreover, Prastiwi (2011) claimed that soft skills involve the skills that related to communication, cooperation, creativity, initiative, and emotional skill. Those skills generally develop in society and really needed in establishing harmonious relation among the society. Ayu (2011) also stated that the advantages of using soft skills in learning process are: (1) become more confident than before, (2) having more friends, (3) getting offer to be a leader in some organizations more frequently, (4) be able to manage the emotion better than before, (5) be able to solve the problem more easily, (6) be able to communicate better than before, (7) be dared to tell the opinion, (8) be dared to speak in front of audience, (9) be dared to negotiate by better way, and (10) be able to be more appreciated and appreciate others.

To facilitate the active learning to encourage students' creativity is needed to use various learning strategies, which is active, creative and contextual, involve cooperative learning, started by a problem, and accommodate the students' different learning style. Those are useful to maximize students' ability in understanding the new things, and then apply the information in their daily life. The active and creative learning can improve the level of learning, from low thinking skill (remember, understand, apply the information) to higher thinking skill (problem solving, analysis, synthesis, and evaluation). Especially in College level, the strength of active learning that develops high level thinking skill should be the main attention. As a result, the learning process become more valued and takes the important role.

Based on the explanation above, the problem based learning based on soft skills (DHSMC) was applied through this investigation in the experiment class, and in the control class was applied problem based learning (PBL). PBL is a kind of teaching models that involve the students to solve the problems through the steps of scientific method. Furthermore, the students can get both the knowledge related to the problem and the skill to solve the problem.

Problem based learning is a learning strategy that uses the problem as the first step for collecting and integrating the new knowledge. Problem based learning was used to stimulate high level thinking in the situation of problem oriented, including learn how to learn. The roles of lecturer in PBL were presenting the problem, asking the questions, facilitating investigation and dialog.

According to the education innovation concept, the students have to own the basic knowledge that useful to solve the problems found, the students learn actively and autonomously with relevant and integrated material, the students were able to think critically and develop initiative. The concept of education innovation rises some changes of paradigm and the implementation such as the lecturer as a facilitator, the changes of curriculum frame, and supplying learning facilities.

Milne (2001) defined that PBL is a teaching method that focuses on problem identification, analysis frame arrangement, and problem solving. This method is done by forming small groups, more cooperation and interaction, discussing incomprehension things, and sharing the role in doing the duties and reporting. Milne (2001) described ideal process of PBL as follow:

1. The lecturer starts the beginning session of PBL by presenting the problem which is going to be solved by the students.
2. The students organized what they understand related to the problem and try to identify related things.
3. The students discuss, ask the questions about incomprehension things.
4. At the end of the first session, the lecturer accompany the students to focus on the important questions, and ask the students to share the responsibility.
5. After the period of self study, at the beginning of the second session the students are expected to share the new information that they got.
6. The new knowledge is implicated in the problem. At the end of the second session, the lecturer can ask the students about what they have been studied and how fit it is.

According to Ibrahim and Nur (2000), PBL consist of five steps, as shown in Table 1 below.

Table1 1. Syntax of ProblemBased Learning

Steps	Teacher's activities
The 1 st step: Students' orientation toward the problems	The teacher explains the objective of learning, explains equipment needed, motivates the students to be involved in the activities of choose problem solving.
The 2 nd : Organize the students to study	The teacher helps the students to define and organize the duties of learning related to the problems.
The 3 rd step: Guide the individual and team investigation	The teacher encourages the students to collect the appropriate information and to do the experiment to find explanation and problem solving.
The 4 th step: Develop and present the result	The teacher helps the students to plan and prepare the appropriate result like report, video, and model. In addition, to help them sharing the duties among their friends.
The 5 th step: Analyze and evaluate the process of problem solving	The teacher help the students to reflect or evaluate the investigation and the processes they use.

Based on the explanation of PBL above, it was applied through the following steps in this research:

1. The lecturer presented the problem that was going to be discussed by the students.
2. The lecturer organized the students to study in group. The lecturer gave the basic concept, instructions, references and skill.
3. The lecturer gave the opportunities to the students to prepare the material for group discussion by seeking the information from various sources such as written article, web page, and text books.

4. The lecturer gave the opportunity to one group to present the result of discussion, and other groups had to ask the questions or give suggestions at least one question from each group.
5. The lecturer and the students reflected, evaluated and elaborated the material had been discussed.

Through PBL the students studied in group. The students were oriented to the problems that demanded the students to seek and discuss the problem solving given. The answers of the problem should be elaborated based on the result of reading various resources and had been discussed thoroughly. The result of group discussion was presented and studied together. During the group presentation and group discussion, the students were demanded to give responses, ask the questions, and give the ideas. Furthermore, each topic can be studied deeply and comprehensively. The presentation and group discussion were facilitated by the lecturer of the subject. As a facilitator, the lecturer took a great role to make the students examine, analyze and develop the topic widely.

In PBMBS, lecturing through five steps above was completed by empowering soft skills at every student's activity. When the students prepare the material for discussion, the students were asked to discuss by building good cooperation, discipline, honesty, and responsibility, appreciation, and polite communication. When the students wrote the report of discussion result, the students were asked to arrange it accurately. DHSMC strategy was expected to increase the students' creativity in following the lecturing and to empower the students' soft skills. The creativity is the interaction between the person and the environment. Besides, an ability to make a new combination based on the data, information, or all things have been known before including all experiences and knowledge gotten during life such as at school, family, and society (Munandar, 2009). Delismar (2013) also stated that the creativity in learning process can give improvement of affective aspect.

The characteristics of creativity are: (1) showing the great eager to know; (2) creating many various ideas to solve the problems; (3) proposing the smart and unique response more often; (4) taking risk bravely, (5) willing to try, (6) being sensitive to the beauty and esthetic of the environment. According to Semiawan (2009), the characteristics of creativity are: (1) taking risk bravely, (2) playing the positive role of creative thinking, (3) formulating and defining the problem, (4) growing up the problem solving, (5) tolerating the ambiguous problem, (6) appreciating others and surrounding. Besides, according to Munandar (2009), the characteristics of creativity can be divided into two, they are cognitive (aptitude) and non-cognitive (non-aptitude). The cognitive consists of originality, flexibility, fluency and elaborative one. The non-cognitive features of creativity involve motivation, personality, and creative attitude. Creativity with cognitive and non-cognitive features is a kind of important potential to be developed. As a result, creativity is the ability that should be developed, be trained, and be kept. The people who are active and creative usually try to increase some logics of thinking and doing. Moreover, they think the new things and apply them to solve the problem. As Hartanto (2011) said that the potential of creativity at individual can be grown by creating the surrounding conditions.

The observed creativity involved: (1) the skill to think fluently (fluency), (2) the skill to think flexibly (flexibility), (3) the skill to think originally (originality), (4) the skill to elaborate (elaborately). Fluency involves: raise many ideas, answers, problem solving, or the questions; give many ways or suggestions to do various things; and always think more than one answer. Flexibility involves: produce various ideas, answers or questions; be able to see the problems from the different views; find out many alternatives; be able to change the way of thinking or approaching. Originality involves; be able to create the new and unique expressions; think the uncommon way to express himself; and be able to make uncommon combination of some parts or aspects. Elaborately involves: be able to enrich and develop an idea or product; add or elaborate the details of an object, idea or situation, so that become more interesting.

METHOD OF THE RESEARCH

This research was supposed to the Mathematics Education Program students of Fakulty of Teaching Trainer and Education Riau University who took the subject of subject Development of High School Mathematics Curriculum (DHSMC)⁴. The total sample of this research was 53 students that consist of 25 students in the control class and 28 students in the experimental class. The experimental class was given treatment by using PBLBS, while the control class was given treatment by using PBL.

The method of this research was Pre-Experimental with Intec-Group Comparison design (Sugiyono, 2013). The objective of the research was to find out the influence of applying PBMBBS toward the students' creativity in taking DHSMC subject. The hypotheses of this research stated that there was any differences of students' creativity between those were gotten PBLBS and those were gotten PBL. The design used can be illustrated as follow:

$$\begin{array}{r} X \quad O \\ \hline O \end{array}$$

There were two variables in this research; they were independent and dependent variable. Independent variable was Learning, that was PBLBS and PBL. The dependent variable was the students' creativity in taking the subject of Development of High School Mathematics Curriculum (DHSMC).

The instruments to collect the data and information about students' creativity in taking the subject lesson were questionnaires by using Likert Scale, observation sheet, and interview guidance. The aspects measured related to flexibility, originality, elaborately, and fluency. The specification of questionnaires can be seen in the table 2 below.

Table 2: Questionnaires of Creativity

No	Measured Aspects	Indicators of Creativity in taking the subject lesson	Number of items	
			positive	negative
1	Flexibility	Raise the various questions	1,3,5	2,4,6
		Tell the various ideas	10	7,8,9
		Give the various answers	11, 13, 14	12
		See the problem from the different side of view	16	15, 17
2	Originality	create the new and unique expressions	30, 32, 33, 34, 35	31
3	Elaborately	Enrich and develop the ideas	36, 37, 38, 39, 40	
4	Fluency	raise many ideas	19, 20, 21	18
		Raise many questions	22, 23, 24, 25	
		Raise many questions	27, 29	26, 28
			27	13
Total			40	

The questionnaires consisted of 40 items, and each item had four options. They are always (SS), often (S), sometimes (K), and never (TP) with score 4, 3, 2 and 1 for the positive statements and score 1, 2, 3, and 4 for the negative statements chronologically. The questionnaires were given before handling the final semester test. The scores of experimental and the control class were analyzed by using SPSS for Windows, the 19th version.

Observation sheets were used to observe the students' creativity while following the lesson. Learning activities involved presenting the material or the problems by lecturer, Students' discussion in small group, presenting the result of small group discussion, and students' discussion between the groups.

Interview was handled after getting the students' creativity score through questionnaires. Based on the creativity scores, it could be decided the group of students whether the high, average and low level in the PBLBS and PBL classes. The interviewees were chosen randomly from the three groups.

From the data of students' creativity at the experiment and control class, it was done the normality and homogeneity test. If the data from two classes are normal distributed and homogeny, the difference of students' creativity will be examined by using parametric test that is t-test, but the data which is not homogeny variance will use t' test. If the data of two classes are not normal distributed, non parametric test will be used.

FINDING AND DISCUSSION

The result of analyzing data showed the average score of students' creativity in experiment class which was given treatment by PBLBS was 66.5, and the control class which was given treatment by PBL was 64.8. These result showed that the average score of students' creativity that was given PBMBS was higher than those given PBL. The significance of difference needed to be tested, such as normality, homogeneity and discrimination test.

Normality test

The formulations of statistic hypotheses to examine the data of creativity are:

H_0 : the sample was normal distributed

H_1 : the sample was not normal distributed

The criteria of testing were: if probability value (*sig.*) of Z was higher than $\alpha = 0.05$, means H_0 was accepted, on the contrary H_0 was refused. To test the normality of the data was used Kolmogorov-Sminov. The result of normality test presents in the following Table 3.

Table 3. Normality Test of Creativity Data

Kelas	N	Rata-rata	KS-Z	Sig.	H_0
PBMBS (Experiment class)	28	66.5	0.149	0.116	diterima
PBM (Control class)	25	64.8	0.142	0.200	diterima

In the Table 3 can be seen that the values of probability (*sig.*) of two classes are more than 0.05, means H_0 was accepted. As a result, the data of creativity at two classes was normal distributed.

Homogeneity

The formulation of statistic hypotheses to examine the homogeneity of creativity data are:

H_0 : $\sigma_1^2 = \sigma_2^2$

H_1 : $\sigma_1^2 \neq \sigma_2^2$

The criteria of testing that used were if probability value (*sig.*) was higher than 0.05, means H_0 was accepted, in contrary H_0 was refused. The homogeneity of data was analyzed by using Lavene statistics. The result of homogeneity of creativity data is shown in Table 4 below.

Table 4. Homogeneity of Creativity Data

Lavene Statistics	Df1	Df2	Sig.
1.689	1	51	.200

In the Table 4 can be seen that probability value (*sig.*) is 0.200, higher than 0.05. It means H_0 was accepted. It can be said that the data of creativity of two classes have the homogeny variances.

Average discrimination testing

The formulations of statistic hypotheses to test the average difference are:

H_0 : $\mu_1 = \mu_2$ (there was no significant difference of average creativity scores of two classes)

H_1 : $\mu_1 \neq \mu_2$ (there was significant difference of average creativity scores of two classes)

The testing criteria used were if the probability value (*sig.*) was higher than 0.05, H_0 was accepted, otherwise H_0 was refused. The difference average was analyzed by using t-test. The result of average creativity score difference was obtained $t = 0.883$ with significance level 0.381. Because the probability value (*sig.*) was higher than 0.05, H_0 was accepted. As a result, there was no difference of creativity average scores between the class with PBLBS and that with PBL.

The average score of students' creativity at PBLBS was higher than at PBL, but still in the medium level. The result of data analysis by using t-test showed that there was no significantly difference of the score difference. Related to the result of observation can be stated that the learning process had been done through PBL steps thoroughly. The steps were: students' orientation to the problems, facilitate the students to discuss the problems given in group, ask representation of group to present the result of group discussion to make more comprehensive discussion, and reflected to the activities in learning process. These steps of learning had support the students' creativity, so the students' activities in PBLBS class and in PBL class was relatively the same. As a result, empowering soft-skills that was applied in PBLBS as additional treatment at PBL had not presented significantly difference at creativity. In fact, there was an increasing the students' creativity in learning process such as asking the questions, telling the ideas, giving the answers, giving the responses, and etc.

Empowering soft skills in PBMBBS that was expected to be able to increase the creativity had not been applied totally. It is necessary to use them continuously to be internalized in students' behavior. As Ayu (2011) said that soft skills dominantly point to psychology skill, the effects can not be seen physically, but can be felt. The result

could be felt were polite, discipline, strength, ability to cooperate, like to help others, etc.

From the interview with the students about their creativity in following DHSMC subject lesson was got the information that the students was encouraged to seek the information related to the given assignment. In addition, the students stated that by having various activities in learning process could improve the attitude of learning from passive to be active.

CONCLUSION AND SUGGESTION

This research showed that there was no significantly difference of students' creativity between the students' who got treatment by PBLBS and those by PBL.

In order to increase the students' creativity through PBLBS, it necessary to make the students accustomed to empower soft skills at every activity in the learning process.

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