

The Use of Ethnomathematics Project Based Learning Model to improve Capabilities Mastery Concept Applicable and Process Skills

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Abstract. The development of learning tools associated with ethnomathematics Project Based Learning (PjBL) model in the topic of Inferential Statistics in this study was aimed to describe the appropriateness of the lecture, to describe the development procedure of learning tools, to test the validity of learning tools, to analyze the practicality of the tools in the learning process, , and to analyze the effectiveness of the tools in the learning process. The result of the development of learning tools as follows: (1) the development of learning tools used Plomp models that contains these phases: the initial investigation, design, realization / construction, testing, evaluation, and revision; (2) the learning tools developed were valid (3) the learning toolswere practical, (4) the learning process was declared effective, the indicators: 1) the ability of the concept and the mastery of Process Skills achieve mastery with the average value of 80, the ability of the concept and the mastery of Process Skills achieve classical completeness with thoroughness reached 85%; 2) The PjBL model class with etnomatematika better than the conventional class; 3) skills positively affects the ability of process concepts and skills .570 positive influence on the process of mastering Process Skills 0.78; and 4) an increase in the process of establishing the ability of concepts, mastery and Process Skills to the class model of ethnomathematics PjBL.

INTRODUCTION

Elementary Statistics is an obligatory course in Mathematics Education major in Pancasakti University Tegal which weighs three credits. Elementary statistic covers three main topics, those are descriptive statistics, probability and inferential statistics. Students seems enjoy the topic of inferential statistics eventhough it contains more concepts compared to other topics. However some students had difficulty in using concept and its applicative mastery. A factor contributing to students' low comprehension of concepts and applicative mastery is the limitation of abilities-based learning materials.

Teaching materials have some classifications. One of them is printed materials such as handouts, books, module, worksheets students, brochures, leaflets, wallchart, pictures or images (Prastowo, 2011:26).Teaching materials used in this study is module..In teaching and learning process, module functions as a source of basic information which can be developed, so that students can study independently, lecturers do not dominate the learning process, and students can measure their own ability. (prastowo, 2011:26).

Concept comprehension is an ability of a person, either intellectually or physically, to convey abstract ideas abstract to classify an object (Ruseffendi,1998: 157) . The Object of this study was the courses Elementary statistics, particularly in the topic of Inferential statisticssso that students can analyze some cases they obtain objectively. There is "apply" in cognitive aspect. The application of (apply) here is defined as an the ability in solving various problems that emerge in daily life. It means that the compression of concept and applicative

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mastery is the ability to convey abstract ideas to classify objects and use their knowledge to solve various problems in daily life.

Considering the importance of the concept mastery and applicative mastery, it is important to develop a learning model that can be used in the classroom in order to create conducive climate and improve the concept mastery and the applicative mastery. Learning model that can be used is a student-centered learning model, namely project based learning (pjbl) model. Pjbl model is a model of learning through certain projects (thomas , 2000) .

According to Joneset, as was quoted by thomas (2000: 1) , PjBL comprises tasks that are given to students based on challenging questions or problems. This model engage students students in designing, problem solving, decision making, or investigating activities; provide an autonomy right for students over a period of time , and results in real product or presentation.

Model pjbl applied in this study was a ethnomathematics pjbl. According to Shirley, as was quoted by hartoyo (2012: 15) , ethnomathematics is a teaching methods which emerges and develops in the social community in accordance with local culture.. According to begg in 2001: 1 , etnomahematics means culture mathematics, which refers not only to ethnic culture, but also to general experience such as language, belief, custom, or history.

In ethnomathematics PjBL in elementary statistic, particularly in the topic of inferential statistics, students can recognize and use the comprehension of mathematical ideas in solving the problems of project; relate mathematical ideas, relate mathematics concepts to other field of study; and relate mathematics to daily life problems .In the learning process, projects pertaining to local culture are carried out.

Indonesia has a uniqueness and cultural diversity that can be reflected from existing conditions and has become its typical characteristics. By its abundant social culture and natural resources, indonesians should be more loyal, care and proud of local culture. However, in the fact shows constast condition, in which people's loyalty, care and respect for local culture decline.

By using ethnomathematics pjbl mdoel, students will find some problems related to the activity of culture mathematics. Students did the planning, observing, applying, and communicating information obtained at ethnomathematics . Those activities are part of process skill. Process skill is a very important skill because process skills is a typical manner in deal with experiences with regard to all facets of reality that is relevant to students. Students are encouraged to participate and active in planning, observing, applying, communicating information especially on the ethnomathematics project

The topic of inferential statistics in the course elementary statistics has many application in reality, social, industry, health, and others. Students are less attractive if learning inferential statistic in a conventional way (expository and task based). Since inferential statistic is an applicative topic, it will be more meaningful and will be not boring if it is taught using project based learning (pjbl) integrated with ethnomathematics (task-based) to be analyzed by students in the class. Every student is encouraged to bring laptop, then the results of the project are displayed and discussed in the class.

Applying teaching model integrated with field project (associated with culture) and the use of laptops in the classroom in the topic of inferential statistics for the course of elementary statistics will improve not only the mastery of concepts related to its application in the real life but also the applicative mastery skill in that course. Several problems mentioned above can be reduced by developing Elementary Statistics module in the topic of Inferential Statistics that is valid, practical and effective. Developing a module which is appropriate and fit to students' characteristics and ability will affect the learning process in the classroom so that the learning process can work effectively (hamalik, 2001: 81).

METHODOLOGY

The study was a research and development study.. The teaching and learning tools developed in this study were: syllabus , lesson plans , a book , worksheets, and test instruments to test the comprehension concepts .The development of those teaching tools whis are integrated with ethnomathematics PjBL to improve the comprehension of concepts and applicative mastery referred to modified Plomp's model of the development of public education (in rochmad , 2011). This model consists of five stages, namely: (1) phase of earlier investigation , (2) phase of design , (3) phase of realization / construction , (4) phase of testing, evaluation , and revision , (5) phase of implementation. The implementation phase did not carried out aexplicitly, but integrated in the implementation of this study. The instruments used to collect the data in this study were validation instrument, observation instrument, questionnaire, test instrument, and interview instrument.

The collected data were analyzed. The teaching and learning tools were validated by a team of experts .According to nieveen as was quoted by rochmad (2012: 69) , the aspects validity can be seen from: (1) whether the developed curriculum or learning model is based on the state-of-art of knowledge or not (content validity), and (2) whether the teaching and learning tools related consistently to each other or not (construct validity) .In this study , the developed teaching and learning tools categorized as valid if the tools are in good or very good criteria.

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According to Nieven as was quoted by Rochmad (2012: 69), the aspect of practicality is considered from the perspective of users: (1) the experts and practitioners consider whether the tools can be used in its normal condition or not; and (2) whether the fact indicates that the tools can be applied by teachers and students or not. In this study, the teaching and learning tools were considered as practical if students give positive responses, and the practicality of the tools in the learning process is categorized as good.

Before the test of effectiveness of learning process, the preliminary test, involving normality test and the homogeneity test, were performed using SPSS 16. To test the effectiveness of learning process, the test of comprehension of concepts mastery and applicative mastery were employed using *One Simple t-test* in SPSS. To test classical mastery, one-sided proportion test was executed. The difference of average ability was tested using one-sided t-test with the assumption that the two classes have the same variance. The t-test was executed in the SPSS using independent t-test. To find out whether the teaching and learning tools effective or not, two proportions were carried out and the number of students whose scores of concepts mastery and applicative mastery passing the minimum standard between experiment and control class were compared. The test of the effect of process skill on the mastery of the concepts and applicative mastery employed regression simple test in SPSS 16. The test of the improvement of concepts mastery and applicative mastery used the variance coefficients (vc).

RESULTS AND DISCUSSION

The development of learning tools in this study used the simplification of modified Plomp's model of development, which simplified the five phases into four phases, without including the implementation phase after the test, evaluation, and revision were completed. This was due to limited time and the limitation of researchers.

Preliminary Investigation

Based on the questionnaire given by the researchers to students of mathematics education Pancasakti University Tegal, it can be drawn the condition in the field relating to the learning process of Elementary Statistics courses in the topic of Inferential Statistics, which are: (1) learning material used were varied with many different terms used so the students got confused, (2) the learning material that had been used did not present students' mathematical ability so this had an impact in understanding the concept of elementary statistics especially in the topic of Inferential statistics, (3) the materials and the examples were not delivered in a systematic way, (4) the learning materials of elementary statistics course, particularly in the topic of inferential statistics did not include the purpose of learning, (5) many formulas were used so the students got confused in applying the formulas, (6) the language used in learning materials of Inferential Statistics was difficult to be understood by students, (7) students of second semester of mathematics education major in Pancasakti University Tegal needed learning materials which are easy to understand, (8) students of second semester of mathematics education major in Pancasakti University Tegal need more explanation from the lecturer regarding the topic of Inferential Statistics as that topic will be required to understand more advanced subject course.

1. Design

In this phase, the learning tools were designed. The learning tools that were developed were syllabus, lesson plans, teaching books, worksheets, and TKK. Those tools were developed based on ethnomathematics PjBL model.

2. Realization/Construction

In this phase, the learning tools were validated and tested (preliminary test and field test). This phase was conducted to obtain following information: (1) the learning tools that had been developed were valid and appropriate according to experts (validator), and (2) the learning tools could be applied in the classroom and were able to accomplish the aim of the learning process. The valid learning tools in this phase was called the first draft.

3. Test, Evaluation, and Revision

In this phase, the learning tools were validated and tested (preliminary test and field test). This phase was conducted to obtain following information: (1) the learning tools that had been developed were valid and appropriate according to experts (validator), and (2) the learning tools could be applied in the classroom and were able to accomplish the aim of the learning process. The valid learning tools in this phase was called the second draft.

1. Analysis of validation of learning tools

The developed learning tools which had been developed were assessed or validated by competent experts, namely validator, to assess the appropriateness of the learning tools. The validator consists of three people, those are three mathematics education lecturers who are expert in Statistics. Content validation was carried out to figure out the validity of the contents of the first draft that had been developed and adapted to the development of

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mathematics tools associated with ethnomathematics PjBL model. Based on the data from the validator team, the developed learning tools integrated with ethnomathematics PjBL were valid.

2. Analysis of Practicality Test

Practicality test was carried out by observing the practicality of learning tools in the learning process, and by considering the response of students of experiment class during the learning process integrated with ethnomathematics PjBL module. According to the data, the developed ethnomathematics PjBL module in the topic of Inferential Statistics was practical to be used.

3. Analysis of the effectiveness of the model

a. Mastery test

in the use of Ethnomathematics Project Based Learning, students did not receive information passively from the teacher. The students built new knowledge actively based on the aim of the learning process that had been set. The result of the learning process showed that the average score of students' concepts mastery in the preliminary field test students' concept mastery in the class integrated with ethnomathematics PjBL model reached 70,5. The scores were obtained from from students' post-test score in the ethnomathematics PjBL class.

One-Sample Test						
Test Value = 70.5						
95% Confidence Interval of the Difference						
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Ye1	10.440	25	.000	11.808	9.48	14.14

b. MasteryApplicative Test

The use of ethnomathematics PjBL encouraged students to learn actively, worked together in groups, planned an ethnomathematics project, and solved daily life problems and other application problems in the worksheets.

Applicative mastery test employed one-sided t-test to find out students' attainment of applicative mastery in the topic of inferential statistics. The data showed that students's average score in the ethnomathematics PjBL class was 70,5 .

The scores were obtained from from students' post-test score in the ethnomathematics PjBL class.

Improvement Test

In ethnometrics PjBL class, the students can answer the problems systematically and in an orderly way. The students are able to not only solve basic inferential statistics problems, but also apply the knowledge they have in solving problems, including ethnomathematics problems.

In this study will be compared the skill process, the concept and mastery applicative on class model charged pjbl etnomatematika the data on the test data pre than when post tests, data and calculation, the results of the concept of data obtained cv the concept grade folks charged pjbl etnomatematika of the post test 0,07007 while from the pre test 0,108781 so the capacity the concept of increased. Cv mastery applicative grade folks charged pjbl etnomatematika of the post test 0,080028907 while from the 0 pre tests, 0,092242 so mastery applicative increased. Similarly cv skill process grade folks charged pjbletnomatematika of the post test 0,122481 while from pre tests is 0,122822 so skill process of increased.

Based on the results of the mastery test, the appeal, the influence and the increase in math and learning through model charged pjblet nomatematik to the matter statistic inference was effectively

CONCLUSION

Based on the result of this study, it can be drawn conclusions as follows:

1. The procedure of the development of learning tools through ethnomathematics PjBL model in the topic of Inferential Statistics for the students of Mathematics Education major Pancasakti University Tegal went well
2. The learning tool with ethnomathematics PjBL model in the topic of Inferential Statistics had been validated by experts, and the result showed that the learning tools developed in this study was valid, and can be used in learning.
3. The application of ethnomathematics PjBL learning model in the topic of Inferential Statistics in mathematics education major in Pancasakti university Tegal was practical

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4. The application of ethnomathematics PjBL learning model in the topic of Inferential Statistics in mathematics education major in Pancasakti university tegal was effective..

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