THE EFFECT OF TREFFINGER LEARNING MODEL THAT WAS ORIENTED BY LOCAL WISDOM ASSISTED TAIRED TASK TOWARD STUDENTS' MATHEMATICAL STRATEGIC COMPETENCE

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Abstract: This study was aimed at determining whether the students' mathematical strategic competence who were taught using the Treffinger learning model that oriented by local wisdom assisted tiered tasks better than of those who were taught using conventional learning. The type of this research was a quasi-experiment with posttest only control group design. The data in this study was the students' mathematical strategic competence that was collected by using essay-test. The data obtained was analyzed using one-paired independent t-test. Characteristics of learning from the results were: (1) involving students in the problem and as an active participant in problem solving, (2) integrating students' cognitive and affective dimensions to seek (3) conducting group investigations to reinforce the idea, and (4) students using the acquired understanding to solve other problems related to daily life. With the assignment of tiered tasks in learning mathematics such as the practice of questions in the form of homework that can be carried out continuously. To complete the tiered problem training properly, a good mathematical strategic competence of students is needed as well. In the learning process, it can also optimize the potential of Balinese local wisdom by conveying advice based on local wisdom. In addition, by delivering advice based on the local wisdom of Bali associated with learning can provide motivation and make learning more enjoyable.

Keywords: Treffinger model, local wisdom

1. Introduction

The quality of education is one factor that determines the quality of human resources (HR) of a nation. Therefore, education must be carried out as well as possible so that it can carry out its role in preparing quality human resources and ready to face global challenges. Various efforts have been done by the government to improve the education quality through the Ministry of National Education, one of which is the improvement of the 2013 Curriculum. Likewise, research in the field of education has developed rapidly. Many studies produce a variety of insights about student learning styles, learning methods, attitudes, student competencies and the development of learning models or devices including mathematics studies. The standard process of learning mathematics formulated by the National Council of Teachers of Mathematics (NCTM) as stated by Carol W. Midgett and Susan K. Eddins in 2001 is: (1) learning to communicate (mathematical communication), (2) learning to reason (mathematical reasoning), (3) learning to solve problems (mathematical problem solving), (4) learning to associate ideas (mathematical connections), and (5) the formation of positive attitudes toward mathematics which are in line with learning objectives mathematics according to the 2013 curriculum which leads to the formation of students' abilities in problem solving. Thus, students' mathematical strategic competencies need to get serious attention in mathematics.

Killpatric (2002) states that mathematical strategic competence is one of the competencies that must be developed in mathematics learning. Strategic competence is the ability to formulate, present, and solve mathematical problems. According to Perkins and Simons in Mulyana (2009) strategic competence is equivalent to problem solving frames (the level of understanding problem solving) which is the ability to think of finding a pattern, solving a problem, applying a strategy in different situations and is the second level of 4 levels of understanding. So that this strategic competence is one of the competencies needed for the achievement of mathematics learning objectives that lead to problem solving abilities that can be observed from the following indicators, namely (1) able to understand the problem, (2) able to present a problem mathematically, (3) able to choose the right formula, approach or method to solve the problem and (4) able to check the correctness of the problem that has been obtained. These four indicators of mathematical strategic competence show that these strategic competencies are related to students' cognitive abilities. In addition, Killpatric (2002) stated that mathematics disposition is also one of the competencies that must be developed in mathematics learning.

Along with the development of science and technology, the development of innovative learning also continues to occur. Educational experts have introduced learning models to make learning more effective. One of the lessons that can maximize students' mathematical strategic competence is the Treffinger learning model. The characteristics of Treffinger's learning model are: (1) involving students in a problem and making them active participants in problem solving, (2) integrating the cognitive and affective dimensions of students to find the direction of resolution to solve the given problem, (3) students doing investigation in groups to strengthen their ideas; and (4) students use the understanding they have gained to solve other problems related to daily life (Idrus Alhaddad, 2015). Judging from the characteristics and syntax, Treffinger's learning model is predicted to maximize mathematical strategic competence because it trains students to solve problems and find diverse solutions.

In the learning process, teacher can also optimize the potential of local wisdom, namely by giving advice based on the local wisdom of the Balinese people. By providing advice based on local cultural values related to learning, especially mathematics, will be able to develop positive character of students. Because the implementation of learning is currently deemed not specifically designed to develop character education (Parwati, 2015). Positive characters that can be developed in the learning of mathematics in elementary schools are, logical thinking, critical, hard work, curiosity, independence, confidence, religious, honest, intelligent, tough, caring, democratic, conscientious, diligent, and never give up. In addition, by giving advice originating from Balinese local wisdom related to learning can provide motivation and make learning more enjoyable.

Considering the importance of mathematical strategic competencies towards the achievement of learning achievement achieved by students, the author considers the need for an effort in learning

mathematics which is capable of directing students to obtain maximum mathematical strategic competence. One effort that can be done is to provide students with tiered assignments. Tiered assignments are given in the form of individual tasks that are done at home (PR) with a level of difficulty that has been designed from a relatively simple level to a more complex while still paying attention to the level of student ability. Assignment of homework is a method used in the teaching and learning process and has its own goals and functions with activities carrying out tasks students will actively learn and feel motivated to learn better, foster initiative and dare to be responsible for their own work. It is expected to be able to awaken students to use their free time for things that support their learning by filling in useful and constructive activities. Giving home assignments at the end of teaching is to better understand the material taught in achieving the expected results (Mukhlisuddin, 2016). Therefore, in learning mathematics, continuous training is needed, such as training questions that can be carried out continuously. For students, learning experiences and working on questions also affect the process of facing the test, students who routinely work on questions in addition to having more provisions in the face of tests can also increase confidence in themselves than students who rarely practice.

Thus, Treffinger's learning model is oriented towards local wisdom assisted by tiered tasks that can foster positive character, make students more active, enthusiastic, and make learning situations more enjoyable. Reflecting this, it is deemed necessary to obtain more reliable empirical evidence about the mathematical strategic competencies of students who follow Treffinger's learning model assisted by tiered tasks better than students' mathematical strategic competencies who follow conventional learning. Therefore, it is necessary to conduct a research entitled "The Influence of Tiered Assisted Local Wisdom Assisted Learning Models on Junior High School Students' Strategic Mathematics Competence".

Based on the background above, the main problem in this study is whether the students' mathematical strategic competencies learned using Treffinger learning models oriented to local wisdom are supported by tiered tasks better than the mathematical strategic competencies of students who get conventional learning? From the problem, the objective of this research is to find out whether students' mathematical strategic competencies that are taught with Treffinger learning models oriented to local wisdom are supported by tiered tasks better or not from the mathematical strategic competencies of students who get coventional learning.

2. Methodology

This is a quasi-experimental research. Quasi-research can be used to see the effects of different treatments given to each group, where researchers cannot control all variables and conditions of the experiment strictly. The population in this study were all eighth grade students of SMPN in Mengwi sub-district in the 2017/2018 school year, namely SMPN 1 Mengwi, SMPN 2 Mengwi, SMPN 3 Mengwi, SMPN 4 Mengwi, and SMPN 5 Mengwi. The sampling technique in this study is two stages cluster sampling with the following stages. In the first phase, the sample group was chosen randomly from the five junior high schools and then obtained SMPN 2 Mengwi and SMPN 5 Mengwi. At SMPN 2 Mengwi there are 10 classes of VIII grade and 11 classes of VIII on SMPN 5 Mengwi. The second stage was continued with random sample selection from the sample group and then obtained the VIIIB class as the experimental group and VIIIC as the control group in SMPN 2 Mengwi, while in the SMP 5 Mengwi was selected the VIIIE class as the experimental group and VIIID as the control group. Through the end of odd semester test scores on mathematics subjects in the 2017/2018 school year the sample was tested for equality using the t-test. The aim is to obtain a sample that is homogeneous so that the differences that arise in the sample group after obtaining pure treatment are caused by the treatment given. Before the equality test is done using the t-test, the data is first tested for normality and homogeneity. In this study testing the data distribution normality was carried out by the Kolmogorov-Smirnov Test, testing the variance homogeneity was carried out by the Levene Test, and the sample equality.

Based on the equalization carried out, obtained sample data with normal distribution, has homogeneous variance, then for the t-test obtained a significance value of 0.871 so that the sample is equivalent. When compared, the significance value is greater than the significance value specified.

Based on the above procedure selected VIIIB and VIIIE classes follow Treffinger learning models oriented to local wisdom assisted by tiered assignments, while classes VIIIC and VIIID follow conventional learning. This study involved independent variables namely Treffinger learning model oriented local wisdom assisted by tiered tasks. The dependent variable in this study is the students' mathematical strategic competence. The research design used was posttest-only control group design. The data collected in this study is students' mathematical strategic competency data. Data regarding students' mathematical strategic competencies were collected by testing mathematical strategic competencies. Scores obtained by students in a test of mathematical strategic competence show students' mathematical strategic competencies. The test used in this study is a description test because in answering the description questions students are required to be able to solve problems in writing in their own language. To avoid the existence of subjective elements, the scoring is guided by the rubric of scoring students' mathematical strategic competencies.

The results of the trial were further analyzed to obtain the validity and reliability of the test. This is done because the research instrument will be said to be good if it has fulfilled two important requirements, namely valid and reliable. The data obtained in this study is quantitative data, namely the scores of students' mathematical strategic competencies. The data analysis technique used is hypothesis testing. Before testing the hypothesis, the normality test and homogeneity of the variance between groups must be tested first. Data normality test is used to ensure that the sample is actually normally distributed so that hypothesis testing can be carried out. Test the normality of the data using Kolmogorov-Smirnov Test statistics. The hypothesis tested in the normality test is as follows:

H0: the data comes from a population that is normally distributed.
H1: the data does not come from a population that is normally distributed.

Homogeneity test between groups is used to measure whether a group has the same variance between members of the group. Homogeneity test using the F-Test. If $F \geq F_{\alpha(v1,v2)}$ then H0 is rejected. This test uses a significance level of 5%. Furthermore, the data were analyzed descriptively using the t-test (1 tail) for hypothesis 2. Statistically, the hypothesis in this study can be formulated as follows:

H0: $\mu_3 = \mu_4$, namely the mathematical strategic competence of students who are taught to use Treffinger learning models oriented to local wisdom assisted by tiered assignments same as the mathematical strategic competencies of students who receive conventional learning.

Ha: $\mu_3 > \mu_4$, namely the mathematical strategic competence of students who are taught using Treffinger learning models oriented to local wisdom assisted by tiered tasks better than the mathematical mathematical strategic competencies of students who receive conventional learning.

Information:

$\mu_3 =$ the average score of students' mathematical strategic competencies that were taught by Treffinger learning models oriented to local wisdom assisted by tiered tasks.

$\mu_4 =$ the average score of students' mathematical strategic competencies learned by conventional learning

3. Discussion

Based on the results of the mathematical strategic competency test, the average scores of students' mathematical strategic competencies who were taught using Treffinger learning models oriented to tiered local wisdom were 49.56 for VIIIB and 47.95 for VIIIE classes. While the average score of students' mathematical strategic competencies taught with conventional learning is 45.24 for class VIIIC and 43.63 for class VIIID.

Before the hypothesis test is carried out, the prerequisite testing of the data distribution includes the normality test, variance homogeneity test, and multicolinearity-test. To test the normality of data distribution in this study using Kolmogorov-Smirnov Test statistics. Based on the results of the normality test, it is found that the statistics for Kolmogorov-Smirnov number of significance is greater than $\alpha = 0.05$. This means that the statistics obtained are significant, so that the null hypothesis is accepted. So the research data comes from a population that is normally distributed. The variance homogeneity test for both classes was analyzed using the F-test. Homogeneity test together using the Box'M test and respectively with the Levene's Test. The results of the analysis show that the significant number generated together is more than 0.05 so that the F price is not significant, the students' self-efficacy and mathematical strategic competencies have homogeneous variants. Likewise, the results of each analysis show that the resulting significance number is more than 0.05 so that the Box ’s M price is not significant, the variance-covariance matrix of the students' self-efficacy and mathematical strategic competencies is homogeneous. Multicollinearity-test was carried out using product moment correlation at a 5% significance level in order to determine the type of statistics used later to test hypotheses, but if both data were correlated then the hypothesis test was carried out with other types of statistics. The result of correlation test with product moment is that for the group of SMPN 2 Mengwi the significance level obtained is 0.001 with a correlation coefficient of 0.381 and for the group of SMPN 5 Mengwi obtained a significance level of 0.022 at a 5%.

This hypothesis 2 test uses a 1-tailed test which has a significance value of 0.000 and 0.009 less than the significance value set $\alpha = 0.05$, so that the significance value is much smaller than the value of α. Thus the null hypothesis is rejected and an alternative hypothesis is accepted which states that students' mathematical strategic competencies that are taught by Treffinger learning models oriented to local wisdom assisted by tiered tasks are better than the mathematical strategic competencies of students who received conventional learning.

Strategic competence refers to students' ability to formulate, present and solve mathematical problems which are the basis for building problem solving abilities. According to Polya (in Suherman, et al, 2003: 99) one way to develop problem-solving abilities is through providing problem solving experiences that require different strategies. The experience referred to here is a situation that has been experienced by students in solving a problem so that when they encounter similar problems or problems related to the previous problem then he will have an initial picture to begin to solve the problem he faces. Students involve themselves fully in the process of new experiences and formulate new concepts based on known concepts so that a good understanding of the previous material is needed which will be used to understand the next material. To facilitate students in solving problems while still referring to local wisdom in it through the provision of advice in the application of problem-based learning models, it is necessary that Treffinger learning models oriented local wisdom assisted with tiered tasks. First, Treffinger's learning model assisted with tiered tasks can make students accustomed to understanding problems, planning solutions, carrying out solutions, and re-examining. Polya's problem solving steps were introduced at the first meeting through LKS by completing each problem-solving step in the place provided then the students applied the steps that had been obtained in the new problem on the LKS while remembering the steps themselves to solve. At the next meeting students are asked to remember the Polya problem solving steps themselves as in the previous meeting. This makes students familiar with Polya's problem-solving steps so that they get used to.

Treffinger's learning model is oriented to local wisdom assisted by tiered assignments which is effectively used to improve students' self-efficacy through systematic problem solving stages and giving motivation at the beginning of learning by presenting problems in an interesting way. In addition Treffinger's learning model also requires active students to use the knowledge they have to solve the given problem. The ability of students to link the knowledge they have is very important. Students can seek help from their environment if they encounter a problem in obtaining relevant information and linking information. Therefore, students are required to actively discuss with friends or teachers. Students need to express opinions or questions if there are things that they don't understand. Tiered assignments are given in the form of individual tasks that are done at home (PR) whose material has been designed from a relatively simple level to a more complex one while still taking into account the level of student ability.

Through Treffinger's learning model oriented to local wisdom assisted by this tiered task, students are able to solve problems systematically in their own way so that a rational thinking process is formed to solve a mathematical problem and will develop confidence in students to be able to solve the problem so that they are motivated to solve the next problem. Therefore, students' mathematical strategic competencies can improve better. Local wisdom that is included in the learning process by providing advice related to Balinese culture can shape the students' positive character.

4. Conclusion

Based on the results of the study and discussion it can be concluded that the following mathematical strategic competencies between students who follow Treffinger learning models oriented to local wisdom assisted with tiered tasks are better than students' mathematical strategic competencies who follow conventional learning.

Suggestions that can be recommended in this study are as follows: (1) Treffinger learning models oriented to local wisdom assisted by tiered tasks need to be socialized to mathematics subject teachers as an alternative learning through seminar activities, training and MGMP meetings because with the model learning resulted in the learning process being more effective and allowing students to feel more confident and happy in learning mathematics. (2) For researchers it was necessary to conduct similar research involving more samples, a more diverse class level considering the required mathematical strategic competence of students in the face of the era of globalization.

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