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The Effect of Team Assisted Individualization Instructional Strategies to Enhance Problem Solving Ability, Learning Activity and Mathematics Learning Achievement

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Abstract: ***The effect of team assisted individualization instructional strategies to enhance problem solving ability, learning activity, and mathematics learning achievement.*** **Abstract: The effectiveness of the team assisted individualization instructional stretagies on problem solving abilities, learning activeness and mathematics learning achievement. Objectives:** The purpose of this study is to determine the effectiveness of TAI learning medol on students' ability to solve problems. **Methods:** The research method uses a quantitative approach with experimental research design. The research subjects involved 83 students of grade VIII at SMP Negeri 10 Tegal. **Findings:** The results of the proportion test on students using the TAI instructional strategies show that $z_{count} > z_{table}$ (1.833 > 1.64), while the MANOVA test results show $\lambda_{count} < \lambda_{table}$ (0.122 < 0.903), and the test results of τ2-Hotelling obtained $F_{count} > F_{table}$ (8.63 > 2.76). **Conclusions:** The TAI instructional strategies is effective in improving problem solving skills, learning effectiveness, and mathematics learning achievement of students.

Keywords: Team assisted individualization, problem solving, mathematics learning achievement

Abstrak: Dampak strategi pembelajaran team assisted individualization to meningkatkan kemampuan pemecahan masalah, aktivitas belajar, dan prestasi belajar matematika. **Tujuan:** *tujuan penelitian ini untuk mengetahui tingkat keefektifan medol pembelajaran TAI terhadap kemampuan pemecahan mahasalah peserta didik.* ***Metode:*** *Penelitian ini menggunakan pendekatan kuantitatif dengan desain penelitian eksperimen. Subjek penelitian melibatkan 83 peserta didik kelas VIII SMP Negeri 10 Tegal.* ***Temuan:*** *Hasil uji proporsi pada peserta didik dengan menggunakan strategi pembelajaran TAI menunjukkan bahwa* $z_{hitung} > z_{tabel}$ *(1,833 > 1,64), sedangkan hasil uji MANOVA menunjukkan* $\lambda_{hitung} < \lambda_{tabel}$ *(0.122 < 0.903), dan hasil Uji* τ^2*-Hotelling didapatkan hasil* $F_{hitung} > F_{tabel}$ *(8,63 > 2,76).* ***Kesimpulan:*** *strategi TAI efektif dalam meningkatkan kemampuan pemecaha masalah, Keefektifan belajar, dan prestasi belajar matematika peserta didik.*

Kata kunci: *Team assisted individualization, pemecahan masalah, pemecahan masalah matematis*

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INTRODUCTION

Education is an activity carried out to improve the quality and quantity of human resources. One example is mathematics education. Mathematics education itself is one of the sciences that must be studied by students obtained from elementary school to college (Ngware, MW, Ciera, J., Musyoka, PK, & Oketch, M, 2015; Yeh, CY, Cheng , HN, Chen, ZH, Liao, CC, & Chan, T. W, 2019). Based on the results of observations and interviews with Mr. Iman Nurofik, M.Pd., as the eighth grade mathematics teacher of SMP Negeri 10 Tegal in the academic year 2017/2018, that mathematics learning achievement has not reached the Minimum Completion Criteria (KKM). Judging from the results of the Grade VIII Opportunities subject matter scores, only 40% of students achieved KKM. The KKM in SMP Negeri 10 Tegal is quite high at 80. The learning model used in the mathematics learning process has actually varied and by using the lecture method, group method, discussion method, and training method. Although in practice it has combined several models and methods, but mathematics learning is still not optimal (Fadlelmula, F. K., Cakiroglu, E., & Sungur, S, 2015). Other factors that influence mathematics learning achievement are: the activeness of class VIII students in participating in learning is still not visible, activeness in doing practice questions in the learning process is still lacking and students are less able to write steps to solve mathematical problems such as: known, asked and determined the right formula for solving problems in math problems.

From the explanation above, it is necessary to choose the appropriate learning model. The importance of the learning model used by teachers in the learning process has an impact on student learning achievement (Subekti, 2017). Therefore, to solve this problem, a learning model that meets the criteria is chosen by using the Team Assisted Individualization (TAI) learning strategies. The TAI instructional strategies is one learning model that provides space to build knowledge that allows students to collaborate and communicate with other students in groups that work together (Astuti, D., 2018). In this case, students are grouped with a number of 5-6 heterogeneous students. Furthermore, given group assignments followed by the assistance of individual teachers for students who need them. In these groups students are responsible and work together to solve problems that have been given. Individuals who previously cannot solve their own problems will be helped by groups. So that the success of students is determined by the success of the group.

The steps of TAI learning are as follows: 1) Placement Test 2) Teams, 3) Teaching groups, 4) Student creative, 5) Study teams, 6) Fact tests and then 7) Team score and team recognitation. This strategy has several advantages, namely weak students can be helped in solving the problem, smart students can develop their abilities and skills and involve students to be active in the learning process (Shoimin, 2014: 200). From the above advantages, this TAI instructional strategies is expected to be one of the solutions to overcome the problems that exist in class VIII of SMP Negeri 10 Tegal.

One of the capabilities in question is problem solving ability. Problem solving ability is the ability of students to solve mathematical problems by first acquiring the knowledge and skills they have. Problem solving skills should be developed in mathematics learning activities by means of teachers teaching and stimulating students to be able to solve problems in mathematics learning (Mulyono, A. et al, 2018). According to Artut, P. D. (2016) that in problem solving, students learn to solve a problem systematically and present their thinking while solving a problem. So that students can find new ways of thinking by solving problems. Indicators

of problem solving ability according to Polya in Hamdani (2011) are: 1) Understanding problems, 2) Planning completion, 3) Carrying out plans and 4) Re-checking.

In solving problems it requires active learning from students. Learning activeness is an activity that involves students to be active in the learning process in order to get success in learning (Lestari, 2017). In this case active students solve their own problems in learning and the teacher helps direct knowledge to students. Learning activeness indicators used refer to D derich (Rusyan: 1992) in (Isnani, 2011), namely: 1) Visual Activities, 2) Oral Activities, 3) Listening Activities, 4) Writing Activities, 5) Drawing Activities, 6) Motorbikes Activities 7) Mental Activities, 8) Emotional Activities.

So that the ability of problem solving and active learning of students can improve mathematics learning achievement. Learning achievement is the result of learning achieved by students when working on assignments and following learning activities in schools proven by being shown through the value of the results of evaluations conducted (Tu'u, 2007). According to Sholikhah (2018) learning achievement is the achievement of cognitive values from learning that has been carried out in a short time. Likewise according to Eliyah (2018) learning achievement is the result of values obtained from processes that produce changes in individuals. In this case it can be concluded that learning achievement is the result achieved by students after the teaching learning process is proven by value.

The Team Assisted Individualization strategy is effective in improving problem solving skills, learning activeness and mathematics learning achievement of students (Marouani, H., Zografidis, A., & Iliadis, A, 2011). Self-effectiveness is a measure that describes a person's success in achieving the desired goal. A learning is said to be effective if the desired target has been achieved (Hamdani, 2011). The effectiveness referred to in this study is effectiveness in learning, namely success achieved in applying the TAI strategy. The TAI strategy is said to be effective if students can solve problems in math problems, students are active in learning and students get good learning achievement.

Based on previous research, it was found that there was an increase in mathematics learning outcomes of students taught by using the TAI instructional strategies (Tinungki, GM (2015); Yang, X (2015); Kim, K., & Moon, N. (2018) ; Farnika (2015); Hecimovich, M., & Volet, S, (2014).

Based on the problems and results of prior research in this study are the effectiveness of Team Assisted Individualization Learning strategy for Problem Solving Ability, Learning Activity and Mathematics Learning Achievement of the Main Material Opportunities. The objectives to be achieved in this study are: (1) Describing the results of learning achievement of students taught with the TAI instructional strategies reaches the target. (2) Knowing whether there are differences in TAI instructional strategiess with conventional learning models on problem solving skills, learning activeness and mathematics learning achievement. (3) Describing the results of the TAI instructional strategies is better than the conventional learning model for problem solving skills, learning activity and mathematics learning achievement.

METHOD

The approach used in this study is a quantitative approach. This type of research is experimental research. Experimental research is a description and analysis of what happens in controlled conditions that are highly considered (Susongko, 2016). The experimental class was treated using the TAI instructional strategies while the control class was treated using conventional learning models. The population

in this study were the second semester students of class VIII in SMP Negeri 10 Tegal 2017/ 2018 Academic Year, totaling 194 students. Sampling using purposive sampling technique, selected class VIII C as the trial class, class VIII B as the experimental class and class VIII A as the control class. Data collection techniques using the method of documentation, tests and questionnaires.

The research instrument was a description test and learning activeness questionnaire. Descriptive tests are used to get the value of problem solving abilities and mathematics learning achievement. Questionnaires are used to get the active learning value of mathematics students (Fadlelmula, F. K., Cakiroglu, E., & Sungur, S, 2015). The instrument was first tested on a trial class. The test of the instrument is validity test, reliability test, difficulty level test and distinguishing test at a significant level of 5%. The data analysis technique used the proportion test, the right t-test, the right-hand side, the MANOVA test and the ô2-Hotelling test which previously were tested by univariate and multivariate prerequisite tests.

■ RESULTS AND DISCUSSION

An univariate and multivariate prerequisite test was conducted first (Fadlelmula, F. K., Cakiroglu, E., & Sungur, S, 2015). After the data are normally distributed and homogeneous univariate and have a normal and homogeneous multivariate distribution, the data can be tested by hypothesis.To calculate the completeness of the learning achievements of students taught by using the TAI instructional strategies, a proportion test was conducted. The results of the table above show that zcount = 1.833 then the results are consulted with the table z value using a real level á = 5%, then z_tabel = 1.64. Because zcount> instructional strategies whose value is more than KKM exceeding 47%.

To find out whether there is a difference that is taught by the TAI instructional strategies and conventional learning models using the One-Way Manova test. The results showed that ëcount = 0.122. The results were then consulted with ëtable with p = number of response variables = 2, VH = free treatment degree = 1, and VE = error free degree = 53 and significance level of 5%, then the price ë_tabel = 0.903 was obtained. And because ëcount <ëtabel then H0 is rejected which means that there are differences in problem solving skills, learning activeness and mathematics learning achievement of students taught by TAI instructional strategiess with conventional learning models.

To determine the problem solving ability, learning activeness and learning achievement of students taught with the TAI instructional strategies is better than the conventional learning model then it is done by the ô2-Hotelling test. The results of the table above show that Fcount = 8.63. These results are then consulted with Ftable, with p = the number of response variables = 3 and n1 + n2-p-1 = 51 and a significance level of 5%, then Ftable = 2.76 is obtained. And because Fcount> Ftable, then H0 is rejected which means that the TAI instructional strategies is better than the conventional learning model for problem solving skills, learning activeness and learning achievement of students.

The average value of mathematics learning achievement of students taught with TAI instructional strategiess is higher than using conventional learning models, so that the learning achievements of students educated with TAI instructional strategiess whose values are more than KKM exceed 47% (Sholikhah, Z., Kartana , TJ, & Utami, W. B, 2018). Problem solving skills, learning activeness and mathematics learning achievement of students who use the TAI instructional strategies are better than students who use conventional learning models (Lonsdale, C., Sanders, T., Cohen, KE, Parker, P., Noetel, M ., Hartwig, T., ... & Moodie, M, 2016).

The results also showed that there were differences in problem solving abilities, learning activeness and mathematics learning achievement of students who were taught using TAI instructional strategiess with students taught with conventional learning models. And the last with the Hotelling -2 test, the conclusions of the TAI instructional strategies are obtained better than the conventional learning model on problem solving abilities, learning activeness and mathematics learning achievement of students.

In line with previous research conducted by Smith, T. J., McKenna, C. M., & Hines, E (2014), Farnika (2015) and Firdaus (2016) found that there was an increase in mathematics learning outcomes of students taught using the TAI instructional strategies.

Increasing students' mathematical communication skills can be grown by using the TAI instructional strategies (Lonsdale, C., Sanders, T., Cohen, KE, Parker, P., Noetel, M., Hartwig, T., ... & Moodie, M , 2016). In line with the results of research by Bellot, J., Sigaud, O., & Khamassi, M. (2012), that improvement in academic achievement in students when compared to conventional models. Strengthened also from research from Arif (2015), which proves that there is an increase in learning activities and economic learning outcomes of class X students of Teuku Umar High School Semarang through the application of the TAI instructional strategies.

■ CONCLUSION

Students taught with the TAI instructional strategies reaches the target set. From the results of statistical tests, it can be seen that there are significant differences in the influence given by the TAI instructional strategies with conventional learning models on problem solving abilities, learning activeness and mathematics learning achievement. Thus, the TAI instructional strategies is effective in improving problem solving skills, learning activeness and learning achievement in mathematics.

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