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Application of The Two Stay Two Stray Model in The System of Linear Equations Reviewed from Learning Achievement

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ABSTRACT
The purpose of this study was to determine the increase in student learning achievement with the implementation of the TSTS type cooperative model. Based on initial observations conducted at MTsN 4 Jombang with early interviews with one of the mathematics teachers and several students of MTsN 4 Jombang, several problems were found as follows: There are still students who have not been able to solve Mathematics problems, There are still students who have not been able to understand the process of solving Mathematics problems, then there are some students who have not been able to operate a formula into solving Mathematics problems. The method used in this study is a quantitative method and uses a questionnaire as a data collection tool. The comparative hypothesis testing of two correlated samples, the researcher used calculations with the IBM SPSS Statistics 22 application with a 5% error rate. Based on the research and analysis in section IV, it can be concluded that there is a significant difference in the level of learning achievement of class VIII K students of MTsN 4 Denanyar Jombang before and after implementing the (TSTS) type cooperative learning model. This finding is supported by the paired t-test with a significance result of 0.000, which is lower than the established error level of 0.05.

Keywords: *Two stay two stray model; Learning achievement.*

INTRODUCTION
Education plays an important role in the development of a country because education is considered the right step to form and create quality human resources so that they are able to support the creation of advanced national development. According to Nafisah (2016) the Republic of Indonesia has set a noble goal of education as stated in the Preamble to the 1945 Constitution Paragraph 4 which states to educate the nation's life. The process towards an intelligent and advanced national life requires education as a means to achieve this noble goal. Law of the Republic of Indonesia Number 20 of 2003 concerning the National Education System regulates in Article 1 that: Education is a conscious and planned effort to create an educational atmosphere and learning process so that students can actively develop their potential to obtain spiritual religious strength, self-control, character, intelligence, noble morals, and skills needed for themselves, for society, and for the nation (Supriadi, 2016).

According to Maharani, et al., (2023) education is a continuous and never-ending process, so that it can produce a continuous quality, which is aimed at the realization of a human figure for the future. According to several expert opinions regarding the definition of education, it can be concluded that education is a conscious effort carried out through guidance, teaching and training activities carried out in schools or outside of school to prepare oneself to be able to play a role in community life, nation and state. Education can be achieved from a practical perspective, in the teaching and learning process that creates interactions between two main components, namely students and teachers. Students are the ones who learn, then teachers are the ones who teach, as students act as the main subjects in learning. Teaching in the education process is not only about conveying lesson material, but also being able to organize the surrounding environment so that students can learn. In order for the teaching and learning process to take

place, students must be the center of activity. This aims to shape personality and civilization and improve the quality of life of students. Education in Indonesia currently faces challenges in terms of content and implementation. The big challenge focuses more on the quality of education, while the challenge of implementation focuses more on the quality of education and the implementation of the teacher education system. The success of learning in schools is determined by various factors. According to Sarjana, et al., (2022) one of these factors is the teacher. Teachers in the context of education have a large and very strategic role. This is because teachers are at the forefront of organizing education. Teachers are people who are in direct contact with students to transfer knowledge and technology as well as teach positive values through guidance and example (Winata, et al., 2021).

Teachers have the ability in the learning process which is closely related to their ability to choose a learning model that can motivate students. Students are the target of the learning process so that they are motivated to learn, have good learning attitudes, can develop critical thinking skills, have social skills, and have better achievement results. The learning model is a strategy used by teachers to increase learning motivation, students' learning attitudes, critical thinking skills, have social skills, and achieve better educational outcomes. Teachers face many problems in learning because they choose teaching models that are less in accordance with the characteristics of the teaching materials and students.

It is very important for teachers to master the subject matter of the learning model, because each teaching presentation must have a clear direction so that the teaching material is easy for students to understand and easy for teachers to present. Teachers who master learning models can innovate in presenting teaching materials that can motivate students to deepen the material being studied. The quality of education in schools can generally be measured by the educational achievements of students. Student educational achievement can be used as a benchmark for student understanding and knowledge of a subject. In addition, the success of a teacher in teaching can be measured by the educational achievements of his students (Suryani, 2010)

According to (Juniardi et al., 2018), globally, the factors that influence student learning are divided into 3 types, namely internal factors, external factors, and learning styles. Internal factors include (1) psychological aspects, such as intelligence level, attitude, talent, motivation, and interest, (2) physiological aspects, including physical condition, physical health, and the condition of the five senses. External factors include the social and non-social environment. As well as learning approach factors, such as strategies and methods used in learning motivation as a psychological factor. The teaching and learning process has the meaning as the overall driving force within students that leads to learning activities, and the continuity of learning activities is what gives direction to learning activities, so that the desired goals of the learning subject can be achieved Improving student learning achievement really requires the role of motivation which is a mental drive that guides human behavior, including learning behavior.

One of the lessons that have been of concern and recommended by education experts to use is cooperative learning (Nasrulloh & Umardiyah, 2020). One of the cooperative learning models is Two Stay Two Stray. Through the Two Stay Two Stray type of cooperative learning, it is hoped that students will dare to express their opinions in their own group, then in other groups. In line with this, also stated that the Two Stay Two Stray structure provides opportunities for groups to share findings and information with other groups (Nuryyati, 2023). Through the Two Stay Two Stray technique, students are divided into several heterogeneous groups, each group consisting of 4 students, where 2 students act as receptionists from another group (Stay) and 2 students are assigned to visit another group (Stray). They discuss or work together to compile an event report with a specific topic given by the teacher. After completion, two students (Stray) from each group will visit the other group. Two students (Stay) who stay in their group are tasked with sharing the results of their work or conveying information to their guests. The students who are guests (Stray) apologize and return to their respective groups. They mention what they have learned from other groups. Students then prepare a report on the results of the discussion. By implementing this method, many positive things can be obtained. One of them is that teachers can make learning time more effective because two students (Stray) also go to other groups to listen to presentations and discussions from other groups there. This is certainly very

different if students or groups come one by one to the front of the class. The time needed for this is certainly longer (Hidayat, 2016).

METHOD

According to Sugiyono (2010) the research method is a functional process in the form of data collection, analysis and interpretation of information related to the object of research, the method used in this study is a quantitative method and uses a questionnaire as a data collection tool. The purpose of this study, the researcher tried to find out the learning achievement abilities of students in class VIII MtsN 4 Denanyar Jombang, by applying the Two Stay Two Stray (TSTS) learning method. So the right type of research for this study according to Sugiyono (2016) is to use a pre-experimental design research type with a one-group pretest-posttest design type.

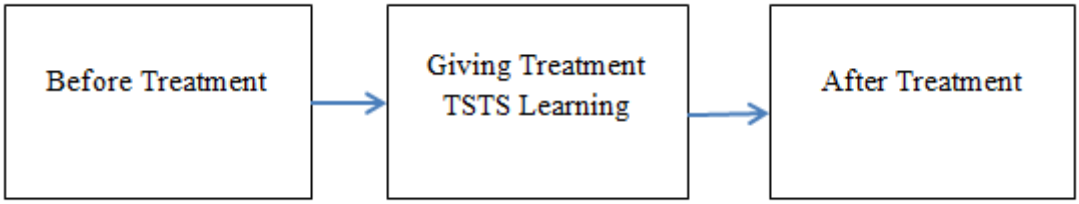

Figure 1. Pre-Experimental Design Research Type With A One-Group Pretest-Posttest Design Type

RESULT AND DISCUSSION

Result

The research was conducted on June 4-5, 2024 at MTsN 4 Denanyar Jombang with 30 students of class VIII K as the subjects of the study. The material tested was the Two-Variable Linear Equation System (SPLDV). In this study, the learning devices used included the Learning Implementation Plan (RPP) with the Two Stay Two Stray (TSTS) learning model, Student Worksheets (LKPD), and test questions containing student learning achievements, each of which had been validated by two validators. The test questions used have been tested for validity and reliability using IBM SPSS Statistics 22. The initial stage in this study was the preparation of learning devices including the Learning Implementation Plan (RPP) with the Two Stay Two Stray (TSTS) learning model, Student Worksheets (LKPD), and test questions containing student learning achievements. The devices used have been validated by two experts and revised according to suggestions from the validators.

Observation of the implementation of the RPP in this study was used to determine whether mathematics learning on the SPLDV material with the Two Stay Two Stray (TSTS) cooperative learning model was implemented in accordance with the RPP. Observation of the implementation of this RPP was validated by an expert. The suggestions and comments given were student observations alone. The results of the analysis of the validation score of the observation of the implementation of the RPP by a validator obtained a percentage of suitability of 92% in all aspects assessed, so the observation of the implementation of the RPP was declared very valid. The results of the analysis of the validation score of the test questions by two experts obtained a percentage of suitability of 92% in all aspects assessed, so the test questions were declared very valid.

The construct validity test was carried out by experts, the next step was to test the content validity of the test questions by testing them on 30 students who would then test their content validity and reliability. The content validity test is an important step in research, which aims to assess the extent to which each question in the test can be considered a valid representation of the concept being measured. This testing process involves testing each question item on the pretest and posttest to ensure its validity before being used in the study. The results of this validity test were recorded and analyzed using the Microsoft Office Excel 2010 application, which were then presented in table 4.4 to provide a clear and comprehensive picture of the validity of the questions used.

Tabel 1. Pre-test Item Validity Test Results

Number Test	r-table	r-count	result
1	0,361	0,654	VALID
2	0,361	0,626	VALID
3	0,361	0,655	VALID
4	0,361	0,399	VALID
5	0,361	0,397	VALID

Based on the results of the content validity test of the pre-test questions above, the r-count of questions 1-5 is greater than the r-table (r-count > r-table), so that the pre-test questions are declared valid. Because the validity test shows that the pre-test questions are valid, the pre-test questions can be used for research to review students' self-confidence before implementing Two Stay Two Stray learning. Furthermore, the results of the post-test question validity test can be seen in table below:

Tabel 2. Post-test Item Validity Test Results

Number Test	r-table	r-count	result
1	0,361	0,513	VALID
2	0,361	0,443	VALID
3	0,361	0,699	VALID
4	0,361	0,597	VALID
5	0,361	0,577	VALID

Based on the results of the post-test item content validity test above, the r count of questions 1-5 is greater than the r-table (r count > r-table) so that post-test questions both numbers 1 to 5 are declared valid. Because they have been declared valid, post-test questions can be used for research to review student learning achievement after implementing Two Stay Two Stray learning. After going through the pretest and post-test stages that have been tested for validity, the next step is to conduct a reliability test on the questions using the Microsoft Office Excel 2010 application. This process will be carried out by applying the Cronbach's Alpha reliability measurement method, which is one of the methods commonly used to measure the internal consistency of a test instrument. This method makes it possible to evaluate the extent to which the questions used can be relied on to measure the intended variables. The results of the pretest post-test question reliability test can be seen in table below:

Tabel 3. Results of the Pretest Post-test Reliability Test

Questions	Cronbach's Alpha	N of Item
Pretest	.519	5
Post-test	.438	5

Based on the results of the reliability test of the pretest and post-test questions, it can be concluded that the Cronbach's Alpha value of the pretest is .519 while the Cronbach's Alpha value of the post-test is .438. The Cronbach's Alpha values of the pretest and post-test are more than 0.60 so it can be concluded that the pretest and post-test questions are declared reliable and can be used for research. Based on the results of the data normality test with Shapiro-Wilk, before being given treatment it has a significance value of 0.335 and after being given treatment it has a significance value of 0.173. The normality test can be concluded that both data have a significance value in Shapiro-Wilk of more than 0.05 so that the data is normally distributed. Based on the test results obtained, the significance value is 0.000. Significance 0.000 < significance level 0.05, so it can be concluded that H_a is accepted. Acceptance of H_a means that there is a difference in student learning achievement before and after implementing the Two Stay Two Stray (TSTS) learning model.

Discussion

The research conducted aims to determine the learning achievement of participants after implementing the Two Stay Two Stray (TSTS) learning model. The learning achievement studied includes two indicators, namely (1) using representations to model and interpret contextual mathematical problems (2) choosing, and applying between mathematical representations to solve problems. Student learning achievement can be known through the results of the tests that are tested. The researcher gave pre-test questions to determine student learning achievement before implementing the Two Stay Two

Stray (TSTS) learning model and post-test questions to determine student learning achievement after implementing the Two Stay Two Stray (TSTS) learning model. Before being given pre-test questions on the material of the two-variable linear equation system (SPLDV), students had been taught the material by the mathematics teacher of MTsN 4 Denanyar Jombang, but the learning method used by the teacher was the conventional method.

TSTS learning is carried out through several stages, namely: Determining Objectives: students will understand the stages of solving two-variable linear equation system (SPLDV) problems. Then it will be continued to the second phase, which is separating students into small groups, consisting of 4 people per group. In this second phase, students have been formed into groups, and then the groups will be given question sheets for each group with the hope that each group can work together and exchange opinions. Each group works together to complete the tasks or projects that have been given. In this process, they discuss and compile their work results. Where in this activity they will discuss to solve the questions that have been given, at this stage it is hoped that students can improve their learning achievements. Two Stay: From each group, choose two members to remain in their group and are responsible for explaining their work results to other groups.

Two Stray: Choose two other members from the group who will move to other groups to get new information and ideas. At this stage, each group will rotate groups so that a group gets information from other groups, and for groups visited by other groups, the group must explain or provide related information about the material. Presentation and Explanation: Members who remain in their group explain the results of their group's work to members who move. Learning from Other Groups: Members who move listen, discuss, and record information from other groups.

Return to Home Groups: After the rotation, members of the groups who moved return to their home groups. Class Discussion: Discuss what has been learned from the other groups and how this new information can enrich the understanding of the topic. At this stage, the groups that previously rotated to other groups return to their respective groups, then convey what they have learned from the other groups, to complete the questions that have been given. Group and Individual Assessment: Evaluate the results of group work and individual contributions. This can be done through observation, quizzes, or assignments. At this stage, researchers work with students to make corrections to the results of the test questions that have been prepared. In addition, they also conduct a thorough evaluation of the questions that have been tested. The correction process includes an in-depth analysis of student answers and identifying potential errors or deficiencies in the questions.

The evaluation is intended to ensure that the tests that have been prepared have met the established standards and can provide an accurate picture of students' understanding and abilities in the topic being tested. The Two Stay Two Stray model encourages students to collaborate, share knowledge, and learn from multiple perspectives, creating a deeper and more dynamic learning experience. Based on the assessment results, there is a significant difference in the level of student learning achievement before and after implementing the Two Stay Two Stray (TSTS) cooperative learning model on the topic of two-variable linear equation systems (SPLDV). This difference is reflected in the pretest and posttest scores, which show a significant increase. Before implementing the TSTS model, the average pretest score was 55.16, while after implementing the model, the average post-test score increased to 78.33. This indicates that the use of the TSTS model positively contributes to improving student learning achievement in the context of mathematics learning. The results of the Paired Sample t-test using the IMB SPSS Statistic 22 application reveal further information regarding changes in the level.

CONCLUSIONS

Based on the research and analysis in section IV, it can be concluded that there is a significant difference in the level of learning achievement of class VIII K MTsN 4 Denanyar Jombang students before and after implementing the Two Stay Two Stray (TSTS) cooperative learning model. This finding is supported by the paired t-test with a significance result of 0.000, which is lower than the error rate of 0.05 that has been set, indicating acceptance of the alternative hypothesis that there is a difference in student learning achievement before and after implementing the TSTS model. The difference is reflected in the increase in the average post-test score compared to the pretest score. Therefore, it can be concluded that the TSTS learning model is effective in improving student learning achievement in mathematics learning.

REFERENCES

Hidayat, A. (2016). Penerapan model pembelajaran kooperatif tipe two stay two stray (tsts) untuk meningkatkan motivasi dan prestasi belajar akutansi siswa kelas xi akuntansi 2 SMK Negeri 1 Tempel tahun ajaran 2013/2014. [Thesis]. https://eprints.uny.ac.id/22013/1/Skripsi%20Full.pdf

Juniardi, A., Martiani, M., & Supriyanto, S. (2018). Analisis faktor-faktor yang mempengaruhi hasil belajar pendidikan jasmani, olahraga, dan kesehatan siswa kelas X Sman 5 Kota Bengkulu. Motion: Jurnal Riset Physical Education, 9(2). https://doi.org/10.33558/motion.v9i2.1359

Maharani, A., Mawaddah, F., Putri, A. G. E., & Sastrawati, E. (2023). Persepsi mahasiswa pgsd terhadap literasi digital sebagai keterampilan abad 21. Innovative: Journal Of Social Science Research, 3(5).

Nafisah, D. (2016). Peran pendidikan muatan lokal terhadap pembangunan karakter bangsa. Citizenship Jurnal Pancasila dan Kewarganegaraan, 4(2). https://doi.org/10.25273/citizenship.v4i2.1078

Nasrulloh, M. F., & Umardiyah, F. (2020). Efektivitas Strategi Pembelajaran Think Talk Write (TTW) pada Pembelajaran Matematika. Jombang : LPPM Universitas KH. A. Wahab Hasbullah.

Nuryyati, R. (2023). Metode pembelajaran two stay to stray untuk meningkatkan pemahaman unsur intrinsik cerpen pada siswa SMP Negeri 1 Cangkringan. Jurnal Pendidikan Bahasa Indonesia, 11(2). https://doi.org/10.30659/jpbi.11.2.30-39

Sarjana, K., Turmuzi, M., Tyaningsih, R. Y., Luluilmaknun, U., & Kurniawan, E. (2022). Faktor-faktor penentu keberhasilan belajar mahasiswa pendidikan matematika di era new normal. Jurnal Ilmiah Profesi Pendidikan, 7(2), 309–316. https://doi.org/10.29303/jipp.v7i2.303

Sugiyono, S. (2016). Metode Penelitian Pendidikan. Bandung: Alfabeta.

Supriadi, H. (2016). Peranan pendidikan dalam pengembangan diri terhadap tantangan era globalisasi. KREATIF : Jurnal Ilmiah Prodi Manajemen Universitas Pamulang, 3(2). https://doi.org/10.32493/jk.v3i2.y2016.p%p

Suryani, N. (2010). Implementasi model pembelajaran kolaboratif untuk meningkatkan ketrampilan sosial siswa. Majalah Ilmiah Pembelajaran, 8(2). http://journal.uny.ac.id/index.php/mip/article/view/3654

Winata, K. A., Zaqiah, Q. Y., Supiana, S., & Helmawati, H. (2021). Kebijakan Pendidikan di masa pandemi. Ad-Man-Pend : Jurnal Administrasi Manajemen Pendidikan, 4(1). https://doi.org/10.32502/amp.v4i1.3338