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The Implementation of Problem Based Learning (PBL) with Two Stay Two Stray (TSTS) to Increase Motivation and Learning Outcomes on Environmental Change Material for SMA

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Info Article	Abstract
	This research aims to determine the increase in motivation and learning outcomes of students on environmental change material through the application of problem based learning (PBL) with two stay two stray (TSTS). This research was carried out in class X-5 of SMA Negeri 11 Semarang in the 2022/2023 academic year with 36 students. There are two cycles in this research with instruments in the form of a learning motivation observation sheet and a multiple choice test at the end of the cycle for measuring learning outcomes. The research showed that the pre-cycle percentage of students who were motivated was 22.2%, while the first cycle increased to 44.5% and the second cycle increased significantly to 100%. The percentage of completeness of learning outcomes in the pre-cycle shows that 27.8% of students have completed it with an average score of 59.2. Observations in cycle I showed an increase to 63.9% of students completing their learning outcomes with an average of 74.3 and cycle II increasing to 88.9% of students completing it with an average of 90.1. Analysis of the data above concluded that there was an increase in student motivation and learning outcomes through the application of the problem based learning (PBL) model with two stay two stray (TSTS).

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INTRODUCTION

Education plays a very important role throughout human life because good quality education can determine the high or low quality of human life (Rafiola et al., 2020). According to (Ramli, 2015) education is an activity with the main actor in learning carried out by the students themselves. Educational problems are closely related to students and how to teach in class. Learning success can be seen from the quality of students in their learning (Uliyandari et al., 2021). If students are able to master and develop their skills to the maximum, then it is certain that learning success can be achieved (Dwijayani, 2019).

The learning process in the classroom should be carried out by paying attention to the characteristics of students (Pradana et al., 2021). The meaning is method that used must be appropriate because errors in choosing a method will result in a learning atmosphere that is not conducive, a passive learning situation, and can affect learning success. The choice of learning method must adapt to the problems in the class and the material that will be taught in the lesson (Lee & Perret, 2022).

SMA Negeri 11 Semarang is an example of a state school in Semarang and has used an independent curriculum in class X with supporting learning facilities. Based on the results of pre-cycle learning that has been implemented, the motivation and learning outcomes for class X-5 at SMA Negeri 11 Semarang are still low compared to other classes. Teaching and learning activities using the group discussion method are still dominated by students with high abilities, while students with low abilities are only passive and do not even tend to work in groups. When learning, only some students pay attention and others tend to be busy alone playing on their cellphones or talking to their friends. This means that some students' dominant motivation to learn is still very low which has an impact on their learning outcomes with an average score of 59.2. This is very far below the minimum completion score (KKM), which is 75.

Based on the facts obtained, improvements are needed that enable students to increase their motivation and learning outcomes. Actions that can be implemented are using variations through the application of problem based learning (PBL) with two stay two stray (TSTS). The material in this PTK is environmental change which requires students to be able to construct the understanding gained and apply it in real life to solve environmental problems. Learning this material can instill the virtue that all actions and behavior carried out can have an influence on the environment.

PBL is a learning model using problems as a basis that uses the context of real world problems as a trigger for solving problems by connecting essential concepts in the learning material taught to students (Maryati, 2018). The problems presented can be solved by students in groups as a focus in learning so as to provide students with a variety of learning experiences such as collaboration and group relationships (Malmia et al., 2019). Apart from that, implementing PBL learning will provide students with learning experiences by making hypotheses, conducting investigations, discussing, presenting, and making conclusions (Suhirman et al., 2021). This states that PBL is able to provide a variety of learning experiences so that understanding regarding something studied increases in the subject matter of environmental change so that it is hoped that they can apply the solution in everyday life.

Learning with groups usually uses group formation at the beginning and will continue throughout each learning activity so that it can cause students to get bored during group discussions because discussions are only carried out with groups at the beginning of learning. One learning method that functions to overcome the boredom of group members is two stay two stray, which is often abbreviated as TSTS. TSTS is learning aimed at encouraging achievement, cooperation, responsibility and helping in solving problems so that they can socialize well through a typical group structure. As the name suggests, in this method there are 2 members who stay in the group and 2 other members visit other groups (Rachmawati & Ernawati, 2018). Group members who remain silent in the group are tasked with sharing group information with the guest group. In implementing learning with TSTS, there are modifications by adjusting the number of students to an even number, namely with 4-5 group members with 2 members being guests to other groups and the other members remaining silent in the group.

The implementation of PBL with TSTS is expected to increase learning motivation so that it will influence students' learning outcomes. Presenting problems with a real world context will increase learning

motivation. Apart from that, discussion activities can be assisted with the TSTS method so that all students are active because each will have roles and responsibilities that must be carried out. This activity can be chosen because during discussions students will have no reason not to play a role in the group. Based on the explanation above regarding the author's background, it is important to conduct classroom action research entitled The Implementation of Problem Based Learning (PBL) with Two Stay Two Stray (TSTS) to Increase Motivation and Learning Outcomes on Environmental Change Material for SMA.

RESEARCH METHODS

The research carried out is classroom action research or what is called PTK. The subjects of this research were X-5 students at SMA Negeri 11 Semarang for the 2022/2023 academic year consisting of 22 female students and 14 male students, so the total was 36. The object of this research was motivation and learning outcomes regarding environmental change material. The PTK procedure is carried out in a cycle form as described by (Arikunto, S., Suhardjono, 2005) with this picture:
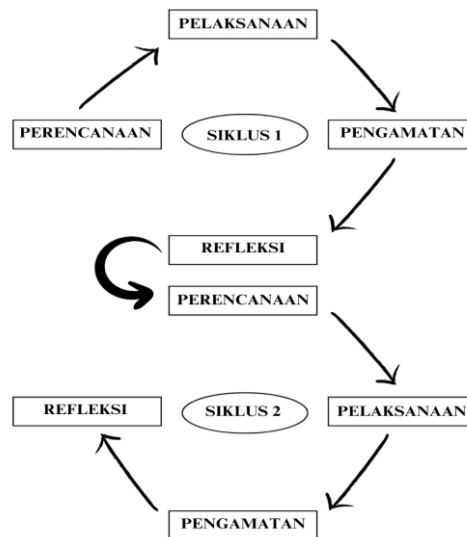

Figure 1. Classroom Action Research Procedure

The research began by carrying out pre-cycle activities at X-5 SMA Negeri 11 Semarang for the 2022/2023 academic year. Then the following PTK cycle is carried out: 1. planning, 2. action, 3. observation, and 4. reflection. Data on motivation to learn environmental change material was obtained using observation sheets, while data on learning outcomes was in the form of multiple choices at the end of each cycle which was divided into two tests with cycle I 12 questions and cycle II 8 questions.

RESULTS AND DISCUSSION

Classroom action research is intended to determine the application of problem based learning (PBL) with two stay two stray (TSTS) on student motivation and learning outcomes. The success of research can be measured by the presence of motivation and increased student learning outcomes (Arikunto, S., Suhardjono, 2005). In this research, success is declared if motivation and learning outcomes meet the indicators, namely (1) students' learning motivation can be said to be successful if $\geq 75\%$ of the total students' learning motivation is included in the high category, namely ≥ 70, (2) the ability of learning outcomes is declared successful if the average percentage of abilities that reach the KKM (75) is $\geq 75\%$ of the total students in the class.

The preparations carried out before carrying out the first cycle of classroom action research were carrying out planning by compiling learning stories using PBL with TSTS. Learning stories are made to guide the teacher's steps in the learning process. The learning process begins through real problems regarding the material provided by the teacher and is discussed in groups of 4-5 members because it adapts to an even number of students. Learning in groups aims to arouse students' enthusiasm for learning so that the results obtained are maximum (Mulyanto et al., 2018). The activities of presenting real problems and discussions in small groups are characteristics of PBL learning (Nurhaedah et al., 2022). According to Arends in (Hosnan, 2014) PBL is learning in which students are exposed to authentic situations to give them the opportunity to build knowledge through their own thinking so that they can improve their skills to a higher level and ask questions as well as their self-confidence. Students work together in groups to solve existing problems.

After carrying out discussion activities in small groups, 2 members in the group will visit other groups as guests while the other members serve as receptionists (Ulinnuha et al., 2021). 2 members who leave the group are tasked with looking for other groups, while 2-3 members who remain in the group are obliged to share the results of their discussion information with the guest group. After the mutual visiting activity is finished, the 2 members return and discuss the results with the original group until the process of summarizing the results. This is a characteristic of learning with TSTS (Lusiana et al., 2017). According to (Ngalimun, S. P., & Pd, 2014) TSTS type learning is learning that involves exchanging information, knowledge and experiences between groups. Meanwhile, according to (Suprijono, 2009), the syntax in implementing TSTS is group division which is carried out at the beginning of learning, then presenting problems as tasks that must be completed by students through discussion activities, two members in the group then make visits to other groups while the other members those who remain in the group participate in presenting the results of their discussion to guests who visit the group. After obtaining sufficient information, the group members make a return visit and review the results of the results to the original group. This learning model will make it easier for students to transfer diverse information to produce appropriate solutions to problems (Harahapa & Surya, 2017).

The learning process continues by giving each group the opportunity to go to the front of the class to present the results of their discussion and other groups to convey their opinions/responses. This type of model is simple so it can be used in any type of subject and level of education because it is fun and inspires the spirit of helping each other thereby increasing student cooperation (Aji & Wulandari, 2021). In this PTK learning activity, the teacher confirms the material that has been studied by reinforcing the findings of the group/facilitator. After taking action, the teacher observes and evaluates the learning process by giving tests to determine the learning outcomes.

Learning motivation data was obtained from ongoing learning using an observation sheet prepared by the teacher as a data collection tool for this research, which consists of 10 sub-indicators of learning motivation. Then, the learning outcomes of environmental change material are measured during the learning process with an evaluation tool consisting of 20 multiple choice questions which are divided into two tests, namely cycle I with 12 questions and cycle II with 8 questions answered by each student via Google form. The success of this research can be achieved if each student gets a score of 70 as the minimum score in the aspect of learning motivation. Meanwhile, classical completeness of learning motivation is if ≥75% of the students in the class have learning motivation in the high category with a minimum score of 70 and their learning results reach the KKM, namely 75, classically the learning results that reach the KKM are above 75%.

This PTK implements two cycles for 3 months, namely March-May 2023. Cycle I is carried out in 2 meetings with the main topic of environmental pollution, namely April 28 and May 5 2023, while cycle II is carried out with the delivery of material on global warming, environmental conservation and waste for 2 meetings, namely May 12 and 2023. The learning process is carried out in a planned manner using the stages

of planning, action implementation, observation and reflection in each cycle through the application of PBL with TSTS. The focus in the learning activities implemented is students' learning motivation during group discussion activities to obtain conclusions that are used in the final activity, namely evaluation. The implementation of learning in cycle II is carried out using the same stages as cycle I but uses the results of reflection in cycle I as a reference in improving learning.

Cycle II reflection is used to improve and provide clearer direction regarding the implementation of learning strategies so that students get used to using PBL with TSTS, improve time management, and maximize the use of learning media by showing motivational videos at the beginning of learning and designing trigger questions into PPT games. Providing this treatment can increase learning motivation because students get the enthusiasm to pay attention and play an active role during learning. Apart from that, providing opportunities for students to choose problems in the problem orientation step in PBL syntax is also a follow-up to the learning process in cycle II. The application of PBL with TSTS carried out by teachers in the classroom for 2 cycles resulted in observational data showing the following:

Table 1 Students (%) in Motivation and Learning Outcomes after Implementing the PBL Model with TSTS

Level	Motivation			Learning Outcome		
	Pre Cycle	Cycle I	Cycle II	Pre Cycle	Cycle I	Cycle II
High (%)	22,2	44,5	100	27,8	63,9	88,9
Medium (%)	0	22,2	0	50,0	2,8	0
Low (%)	77,8	33,3	0	22,2	33,3	11,1
Average	54,2	65,8	86,4	59,2	74,3	90,1
Classical Completeness (%)	22,2	44,5	100	27,8	63,9	88,9

Information :
Students' learning motivation
High: % meets all learning motivation indicators
Medium: % meets 5 indicators of learning motivation
Low: % meets less than 5 indicators of learning motivation
Student learning outcomes
High: % with a percentage ≥75
Medium: % with a percentage value of 75-(average value for each cycle)
Low: % with a percentage below the average value for each cycle

The increase in learning motivation in all PTK activities starting during pre-action, cycle I and cycle II after the recapitulation is presented in table 1 above which shows the improvement achieved. The average learning motivation of students in pre-action was 54.2 or as many as 22.2% of students in the learning motivation class were in the high category. In cycle I, learning strategies were implemented with the average learning motivation being 65.8 with 44.5% of students having high learning motivation, which means there was an increase in results compared to pre-action by 21.3%. In cycle II, high category learning motivation showed an increase to 100% with an average of 86.4. If observed from cycle I to cycle II, learning motivation increased by 55.5%, with learning motivation having an average of 65.8 in cycle 1, increasing to 86.4 and in cycle II increasing by 20.6. Student learning outcomes in implementing PBL with TSTS experienced an increase in percentage per cycle which was observed, namely pre-action from 27.8% to 63.9% in cycle I, resulting in an increase of 36.1%, from 63.9% in cycle I to 88.9% in cycle II means an increase of 25%. The pre-action learning results from cycle I to cycle II showed an increase. The evaluation results show an increase in learning completeness from 10 students (27.8%) in pre-action to 23 students (63.9%) in cycle I to 32 students (88.9%) in cycle II. Meanwhile, the average learning outcomes appeared to increase from 59.2 during pre-action to 74.3 in cycle I to 90.1 in cycle II.

This learning model by combining methods in learning at PTK has proven to increase student motivation and learning outcomes. The implementation of PBL encourages students to be motivated to participate in learning because the problems raised are real problems around them and students can understand the theory deeply through an empirical learning practice experience (Hmelo-Silver, 2004). Learning activities are carried out by grouping students together and then discussing using the TSTS method to solve problems on the LKPD that has been distributed. This is in line with research by (Prasetyo, 2016), namely learning using PBL using the TSTS method as seen from increased motivation and social studies learning outcomes for class VIII D SMP Negeri 14 Surakarta. Research (Susiyani, 2022) on the PBL model with TSTS shows that the learning achievement of class IV students at SD Purwoprajan 2 has increased. This research is also supported by research (Rachmawati & Ernawati, 2018) namely that learning with TSTS is effective in increasing motivation and learning outcomes for class VII SMP Negeri 11 Yogyakarta for the 2016/2017 academic year.

Success in PTK is based on classical success criteria which are observed by showing motivation to learn if in one class there are at least 75% of students who get a score of 70 and their respective learning outcomes reach the KKM, namely 75, classically those who reach the KKM ≥75%. Based on the description of the research data above, the application of PBL with TSTS increases student motivation and learning outcomes which can be seen from the results of observations and data results from cycle I to cycle II.

CONCLUSION

The conclusion obtained by this research is that the application of problem based learning (PBL) with two stay two stray (TSTS) is able to increase students' motivation and learning outcomes regarding environmental change in class X-5 of SMA Negeri 11 Semarang for the 2022/2023 academic year.

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