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# THE APPLICATION OF THE TEAMS ASSISTED INDIVIDUALIZATION (TAI) LEARNING MODEL TO IMPROVE THE LEARNING OUTCOME OF THE STARTER MOTOR ELECTRICAL SYSTEM IN VHS

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**ABSTRACT**

This research was carried out at Vocational High School (VHS), where the student's abilities for The Starter Motor Electrical System were still low. The objectives of the study were: to know (1) the application of the TAI (Team Assisted Individualization) learning model for the Motor Starter Electrical System learning in VHS; (2) the improvement in learning outcomes and the percentage of student graduation in the Motor Stater Electrical System learning with the TAI application learning model in VHS; (3) the extent to which the escalation of learning outcomes and the percentage of student graduation in the Motor Stater Electrical System learning after the TAI learning model application. This research belongs to Classroom Action Research, and the subjects were the VHS students. Data were collected using observation methods and test instruments. After the data were obtained, it was analyzed using descriptive analysis techniques. The research results show that: (1) The application of learning using the TAI learning model is carried out in the planning, action and closing stages. (2) The implementation of the TAI learning model can improve students' learning outcomes, (3) the percentage of students' graduation of 33.33% with an average score of 60.55 was getting higher to 58.33% in the first cycle with an average value of 69.02 and 94.44% in the second cycle with an average value of 78.47, respectively. It indicates the escalation of the average value of the students' learning outcomes by 9.45 and the percentage of students' graduation by 36.11%, respectively.

**Keywords:** Teams Assisted Individualization (TAI), learning outcomes, starter motor electrical system

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## INTRODUCTION

Education is a process of deliberate activity to gain a helpful result (Agavelyan, et al., 2020), and it has an essential role in the development and self-realization of individuals (Ariyanti, et al., 2018; Suyitno, 2016). Education refers to an effort to enhance the quality of human resources to create a more educated person who cares on their surrounding environments (Eliseyeva, et al., 2016) by providing guide plans to build a conducive learning atmosphere and process (Rokhmani, et al, 2019). Learning is a communication process involving students,

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teachers and materials (Makmuri & Suyitno, 2021) that combine human elements, materials, facilities, equipment, and procedures (Yu & Du, 2019). The learning process can be carried out both in a non-formal setting like the environment and in proper places such as schools (Rudeloff, 2019). Schools are educational institutions that develop all students' potential (Djamarah, 2012) of which many interrelated elements determine success in the teaching and learning process (Fürstenau & M. Hommel, 2019). These elements are teachers, students, curriculum, learning models, learning media, tests, and the school environment (Sudjana, 2020).

The learning context in vocational education refers to the specific training for the world of work to prepare for a particular job or to support one's career (Roll & Ifenthaler, 2021). Vocational education aims at preparing the workforce and is intended for anyone who needs it, those who want to elevate their skills to enter the labour market (Supriyadi & Suyitno, 2020). The teaching and learning process becomes a trigger for students to learn (Purwanto, 2014). It refers to a scenario from the teacher's action plan in delivering learning materials based on the lesson plan and syllabus. By having a good plan and well structure, it is hoped that the learning process can run based on the plan. The learning process must be carefully arranged as the acquisition of habits, knowledge, and attitudes, including new ways of doing things and one's efforts in overcoming obstacles or adjusting to new situations (Oemar, 2017). This process describes a progressive change in a person's behaviour when reacting to the demands that are faced (Wardhani, et al, 2019). Learning enables one to enhance their attention or achieve a goal.

The success of a teaching and learning process can be seen from the learning outcomes achieved by a student (Uno, 2013). However, material understanding as one of the learning outcomes is different from one student to another (Saleh, et al, 2019). Student learning outcomes can be measured from student scores after working on questions and assignments given by a teacher when the evaluation was carried out (Slavin, 2015). Saleh, et al, (2019) revealed that learning in schools can be seen from the success of students' learning. To support student success in education and improve their learning outcomes, the curriculum designer and the teachers must work hand in hand so that student learning outcomes can improve significantly (Supriyadi & Suyitno, 2020). Based on the observation results in the State VHS 8 Purworejo, the students' learning outcomes on the Motor Starter Electrical System course are t The results of student tests showed that the average value was 65.00. The results are less than the KKM that has been determined at State VHS 8 Purworejo, i.e 70.00. Based on the results of the field survey, the learning model used by the teacher in learning the Motor Stater Electrical System still employed the conventional model with many theoretical focuses so it seemed that the students had a low attraction to follow the course. The learning process with a lecturing model combined with note-taking is still dominating, it made the learning process less interesting (Rohr-Mentele & Forster-Heinzer, 2021). It is teacher-centred where the teacher only explained the subject content while the students listen and take notes. It was not completed with proper feedback, so the teacher failed to identify the students who were still confused with the materials (Kärner & Höning, 2021).

Based on the results of the observations above, it is crucial to make a further investigation to apply appropriate learning models to enhance students' learning outcomes. A study in the form

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of a classroom action research with the application of the Teams Assisted Individualization (TAI) learning model will be beneficial to improving the students learning Outcomes in the Motor Stater Electrical System (Arinaitwe, 2021). This study aims at revealing (1) the application of the TAI (Team Assisted Individualization) learning model for the Motor Starter Electrical System learning in VHS; (2) the improvement in learning outcomes and the percentage of student graduation in the Motor Stater Electrical System learning with the TAI application learning model in VHS; (3) the extent to which the escalation of learning outcomes and the percentage of student graduation in the Motor Stater Electrical System learning after the TAI learning model application.

## METHOD

The study belongs to Classroom Action Research as an examination of learning activities in the form of an action, which is intentionally raised in a class (Arikunto, 2014; Suyitno, 2018). This research was carried out at VHS located in Purworejo, Central Java. This research was conducted for six months, from October to March 2022. The subjects in this study were the students of XI class in the Light Vehicle Engineering, totalling 36 students. The object of this research was the implementation of the Motor Starter Electrical System learning using the TAI (Teams Assisted Individualization) cooperative learning model. The Classroom Action Research (CAR) design was done in four steps, as presented in the following chart (Novitasari, 2018).

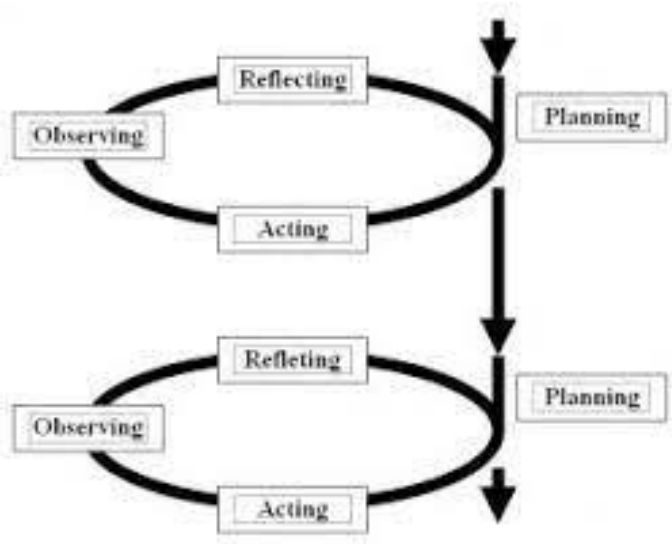


Figure 1. Kemmis and Mc Taggart Model Classroom Action Research Design

Based on the CAR cycle schematic above, the research stages can be described as follows:

1. the Cycle I

a. Planning Phase

The activities carried out at this stage include:

1)Preparation of learning design, such as determining the types and topics to be used as group projects, group discoveries, and classroom learning activities.

2)Making research instruments and arranging lesson plans.

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3)Informing to students regarding the learning that would be carried out using the Team Assisted Individualization learning model.

b. Action Stage

At this stage, the lesson plans in the form of the Team Assisted Individualization learning model were applied in the learning process involving:

1) Placement Test

The teacher gives an initial test (pre-test) to students to find out weaknesses of the students' material mastery in the Motor Stater Electrical System.

2) Teams Creation: The teacher forms groups of 5-6 students.

3) Teaching Group, the teacher gave the material briefly before the group assignments.

4) Students' Creativity, the teachers emphasized and shaped a perception that the success of each student (individual) would determin the group success.

5) Team Study

The students learned in a group on given the worksheets. Teachers provided personal assistance to students and the students with good academic abilities in the group acted as peer tutors.

6) Fast Test

The teacher gave small tests based on the facts obtained by the students, like quizzes and so on.

7) Team Score and Team Recognition

The teacher gave scores on the group work results and a "title" award to the group as the champion.

8) Whole-Class Units

The teacher presented the material with problem-solving strategies for all students in the class.

c.Observation

Observation functioned to see and document the effects of the actions in the classroom [31], especially in the learning process of the Motor Starter Electrical System using the Team Assisted Individualization learning model. This stage is aimed at collecting evidence of the action so that it can be evaluated and used as a basis for reflection.

d.Reflection

At the end of the cycle, it was a reflection on the learning implementation based on the action stage and the observations. Those were analyzed as material to reflect on whether the learning that was carried out had been in line with the plan. If it were not, it would proceed to cycle II.

2. the Cycle II

The reflection results in the first cycle were then followed up with the implementation in the second cycle. The stages carried out in this cycle include:

a) Planning

1)Prepare Lesson Plan.

2)Prepare the same instrument in cycle I.

b) Action

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The implementation of learning was based on the lesson plan by applying the Team Assisted Individualization model.

c) Observation

It was done to see the effects caused by actions in the classroom, especially in the learning process of the Motor Starter Electrical System, using the Team Assisted Individualization model by directly observing the teaching and learning process.

d) Reflection

At this stage, the researcher compares the results in cycle II with the results in cycle whether an escalation in student learning outcomes. If there was no improvement in their learning outcomes, the cycle would be continued, and the researchers and teachers would stop it if it was successful.

Data collection techniques

1. Observation

This technique was carried out by conducting careful observations and recording systematically (Arikunto, 2014) to see the learning process and the students' activities, including their involvement, independence, and collaboration during the learning process

2. Test

It was a tool or procedure used to measure students learning outcomes with predetermined rules (Arikunto, 2014), primarily to determine students' material mastery level. It was useful to assess the success of students in understanding the Motor Starter Electrical System. The test was given at the end of each cycle. A research instrument is used to measure the observed natural and social phenomena (Sugiyono, 2013). The tools used to collect data in the study include questionnaires (questionnaires) and tests. The data analysis technique that will be used in classroom action research are as follows:

1. Descriptive Statistics

Descriptive statistics was to analyze data by describing the data without intending to make conclusions for generalizations (Sugiyono, 2013). The use of descriptive statistical techniques in this study was in tables, graphs, and calculations of data distribution.

2. Questionnaire Analysis

The application of the Team Assisted Individualization learning model can be considered good if it meets the criteria level of 60%. So, this learning model can be applied in teaching and learning activities. The assessment application employed the criteria of 1 for "strongly agree", 2 for "agree", 3 for disagree, and 4 for "strongly disagree". The following criteria were set to determine the conclusion of the results that have been achieved:

Table 1. Students' Response Criteria

| Interpretation Criteria | Percentage | Criteria |
|---|---|---|
| 1 | 80% - 100% | Strongly Agree |
| 2 | 60% - 79% | Agree |
| 3 | 50% - 59% | Disagree/ Revise |
| 4 | < 50% | Strongly Disagree/ Replaced |

The formula for processing student response data is as follows:

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$$NP = \frac{R}{SM} 100\%$$

3. Data analysis of students' learning outcomes

a. Analysis of student data who obtained a learning outcomes score of 75

To calculate the percentage of the students who obtained the learning outcome score of 75 (completed), the way to find the percentage is with the formula as follows (Purwanto, 2019):

$$NP = \frac{R}{SM} 100\%$$

b. Analysis of the average value of student learning outcomes

Learning outcomes in each cycle were calculated to gain the mean. Then, the student's learning outcomes in the first cycle were compared with the second cycle. If there was an improvement, it indicated that the Team Assisted Individualization type of cooperative learning model could improve students' learning outcomes. The formula for calculating the average value of each cycle is as follows (Sudjana, 2020).

$$\bar{x} = \frac{\sum x}{N}$$

After the data was collected from cycle I and cycle II, the level of student success in learning the Motor Stater Electrical System can be seen using a cooperative learning model with the Team Assisted Individualization (TAI) type at VHS. The success of the research is indicated by an escalation in each cycle (Muja, et al, 2019). Based on the KKM applied at VHS, i.e. 75.00, this study can be successful if the number of students with the percentage of 75% learning outcomes gets higher.

## RESULTS AND DISCUSSION

Based on the initial observation results, the scores obtained by students in the pre-action pre-test were below the Minimum Completeness Criteria (KKM) of 70. Of the 36 students, 12 students had fulfilled the KKM, and 24 students had not met the criteria with an average score of 60.55.

The classroom action research was done consisting of two cycles. This cycle was implemented to improve students' learning outcomes with the application of the Team Assisted Individualization (TAI) type cooperative learning model. By changing the learning model, the students' average scores of learning outcomes were getting higher. The escalation can be seen by comparing the value of student learning outcomes in three research stages: the pre-action initial test, cycle I, and cycle II.

After using the Team Assisted Individualization (TAI) type of cooperative learning model in the first cycle, there was an increase from the pre-action stage test. Of the 36 students, 21 students have met the KKM, and 15 students were below KKM with an average score of 69.02. This value was below the minimum average score. It means the learning process needed more treatment to achieve the performance indicators as expected. After reflection, it was decided to

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continue with the second cycle by correcting the weaknesses that occurred in the first cycle. In the second cycle, from 36 students, 34 students had met the KKM, and two students were below the KKM with an average score of 78.47. In the second cycle, the performance indicators in the research had been achieved well, and the student learning scores have increased to 78.47. The average value of student learning was already above the minimum requirement.

Based on these data, it can be seen the average value of student learning outcomes by using the following formula:

$$\bar{x} = \frac{\sum x}{N}$$

Where:

$\bar{x}$ = average (mean)

$\sum$ x = total score

N = many subjects

1) The results of the average student learning scores on pre-action
   = 2180 : 36
   = 60.55
2) The results of the average student learning scores on cycle I
   = 2485 : 36
   = 69.02
3) The results of the average student learning scores on cycle II
   = 2825 : 36
   = 78.47

The improvement of student learning outcomes in completing the test questions can be seen by comparing the results of the average scores at the pre-action stage, cycle I, and cycle II. The following Table 2 is the average escalation of the students' learning outcomes after completing the starter motor electrical system test.

Table 2. The Average Score of Pre-Action, Cycle I, and Cycle II Students' Learning Outcomes

| **Average value** | | | **Improvement** | |
|---|---|---|---|---|
| **PT** | **SI** | **SII** | **SI-PT** | **SII-SI** |
| 60.55 | 69.02 | 78.47 | 8.47 | 9.45 |

**Explanation: PT**: Pre-Action, **SI**: Cycle I, **SII**: Cycle II

Based on Table 2 above, the average value of the pre-action test, cycle I, and cycle II increased. The average value of the starter motor electrical system test before using the Team Assisted Individualization (TAI) cooperative learning model at the pre-action stage was 60.55. The average value obtained at the pre-action stage was considered low. The low average scores were due to using the teacher-centered conventional lecture learning model. It made students feel bored so many students paid less attention to the teacher's explanation and did not actively involve

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in the learning process. After knowing the average result was low, the researchers made improvements by taking action in cycle I.

After the first cycle of action by applying the Team Assisted Individualization (TAI) type of cooperative learning model, the results of the average class value increased compared to the pre-action. The average value of the class in the first cycle is 69.02. The increase in students' scores instead of the initial test (pre-action) was caused by the implemented learning model.

In this second cycle, the results of the students' class average scores increased. The class average results were 78.47. In this second cycle, the researcher conveyed the results and errors obtained in the first cycle. In addition, the researchers motivated students to have confidence in learning to be able to complete on the given tests. In cycle II, the students already understood the type of Team Assisted Individualization (TAI) cooperative learning model. It made them more active and confident in participating the learning process. The researchers asked for opinions and input from students to obtain feedback from students.

From the description of the study, it can be seen that student learning outcomes in learning the electric starter motor system by applying the Team Assisted Individualization (TAI) type cooperative learning model in class XI TKR A students had increased. It can be seen from the average value at the pre-action stage, cycle I, and cycle II. The average value of the pre-action before implementing the Team Assisted Individualization (TAI) type of cooperative learning model was 60.55. Then, in the first cycle, by applying the TAI cooperative learning model, the average score obtained by students increased to 69.02. Thus, the escalation of the average score among students from pre-action to cycle I was 8.47 points. Also, in the second cycle, the students' average scores increased to 78.47 or 9.45 points by correcting the obstacles and weaknesses that occurred in the first cycle. Based on the description above, it can be concluded that using the TAI cooperative learning model can improve student learning outcomes in learning the starter motor electrical system. The appropriate learning models like the Team Assisted Individualization (TAI) type cooperative learning model can improve students' learning outcomes and be proven to be able to enhance the learning activities on the starter motor electrical system.

This study also presented the student graduation based on the achievement of the minimum completeness criteria. After applying the learning model the percentage of student graduation had increased. The percentage of passing students who have reached the minimum completeness criteria in the pre-action, s 33.33%, rose to 58.33% in the first cycle and 94.44% for the second cycle, respectively. It can be seen that the percentage of student graduation had reached 75.00% of the total number of students who got a score of 70.00.

Data on the percentage of students passing pre-action, cycle I, cycle II, both before and after implementing the Team Assisted Individualization (TAI) type of cooperative learning model can be presented as follows.

*Pre-Action Student Graduation Percentage*

The following Table 3 is the students' graduation percentages before implementing the Team Assisted Individualization (TAI) cooperative learning model.

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Table 3. Data Percentage of the students' graduation results before the treatment

| Class interval | F | F% |
|---|---|---|
| 0-34 | 0 | 0 % |
| 35-39 | 2 | 5.55 % |
| 40-44 | 1 | 2.77 % |
| 45-49 | 2 | 5.55 % |
| 50-54 | 4 | 11.11 % |
| 55-59 | 4 | 11.11 % |
| 60-64 | 7 | 19.44 % |
| 65-69 | 4 | 11.11 % |
| 70-74 | 6 | 16.66 % |
| 75-79 | 4 | 11.11 % |
| 80-84 | 2 | 5.55 % |
| Total | 36 | 100 % |

Based on the results of Table 10 above, it can be seen that the percentage of students who have achieved scores below or above the KKM.

a. Percentage of Students below the KKM

NP = 24: 36 x 100

= 66.67 %

b. percentage of students above the KKM

NP = 12: 36 x 100

= 33.33 %

Based on the calculation of the results on the pre-action graduation percentage above, it can be seen that 24 students had not met the KKM or 66.67%. The students who had fulfilled the KKM were 12 students or 33.33% of the total 36 students.

*Percentage of Student Graduation Cycle I*

The following is the percentage of student graduation results in the first cycle after applying the Team Assisted Individualization (TAI) cooperative learning model.

Table 4. Data Percentage of the students' graduation results after the treatment

| Interval class | F | F% |
|---|---|---|
| 55-59 | 3 | 8.33 % |
| 60-64 | 9 | 25 % |
| 65-69 | 3 | 8.33 % |
| 70-74 | 8 | 22.22 % |
| 75-79 | 6 | 16.66 % |
| 80-84 | 4 | 11.11 % |
| 85-89 | 3 | 8.33 % |
| Total | 36 | 100 % |

Based on the results of Table 4 above in the first cycle, it can be seen that the percentage of student graduation from all students below or above the KKM.

a. Percentage of Students below the KKM

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NP = 15 : 36 x 100

= 41.67%

b. percentage of students above the KKM

NP = 21 : 36 x 100

= 58.33%

Based on the calculations above, there was an escalation in the percentage of students' achivement. In the first cycle test, 15 students had not met the KKM or 41.67%, while the students who had fulfilled the KKM were 21 students or 58.33% from the total 36 students.

*Cycle II Students' Graduation Percentage*

The following is the percentage of student achievement results in cycle II after the treatment and revision of the shortcomings or weaknesses that occurred in the first cycle.

Table 5. the Percentage of Student Graduation Results in the Cycle II

| Interval class | F | F% |
|---|---|---|
| 60-64 | 1 | 2.78 % |
| 65-69 | 1 | 2.78 % |
| 70-74 | 2 | 5.56 % |
| 75-79 | 11 | 30.56 % |
| 80-84 | 12 | 33.33 % |
| 85-89 | 7 | 19.44 % |
| 90-94 | 2 | 5.55 % |
| Total | 36 | 100 % |

Based on Table 5, the percentage data on the students' achievement results in cycle II above, it can be seen that the percentage of students who scored below or above the KKM.

a. Percentage of Students below the KKM

NP = 2 : 36 x 100

= 5.56%

b. percentage of students above the KKM

NP = 34 : 36 x 100

= 94.44%

Based on the above calculations, it can be explained that the percentage of student achievement had increased in the implementation of cycle II. In this cycle II, the students below the criteria were 2 students or 5.56%, while those above were 34 students or 94.44% of the total 36 students. It indicates an escalation in student achievement percentage from the pre-action stage, cycle I, and cycle II as presented in Table 6 below.

Table 6. Escalation of Students' Achievement

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| No. | Student Achievement Percentage | Pre Action | Cycle I | Cycle II |
|---|---|---|---|---|
| 1 | below the criteria | 66,67% | 41,67% | 5,56% |
| 2 | above the criteria | 33,33% | 58,33% | 94,44% |

Based on Table 6 above, almost all students obtain scores below the minimum completeness criteria in the pre-action assessment data. Of the 36 students, only 33.33% or 12 students scored above the criteria. The students who scored below the standards were 66.67%, or 24 students. The low results of students' learning scores were caused by several factors, including learning models that still used the teacher-centred model (Helm, 2015). It caused students to be less enthusiastic in participating in the learning process. The students become passive and it causes boredom (Seelen, et al, 2018). It makes students pay less attention to the teachers' explanations, and they are failed to complete the test. Then, the researcher applied the Team Assisted Individualization (TAI) type of cooperative learning model which was carried out for two cycles, the cycle I and the cycle II. By applying the Team Assisted Individualization (TAI) cooperative learning model, it can be seen in the first cycle data that the percentage of student graduation had increased. Of the 36 students, the students scored above the criteria were 21 students or 58.33%.

Meanwhile, those who scored below the criteria were 15 students or 41.67%. The low scores among students were caused by their low material understanding. In addition, several students' attitudes were apathetic and showed low involvement during the learning process. Most students ignored the explanations from the researcher as a teacher during the learning process.

In the second cycle of data, there was a significant improvement. Only two students obtained the scores below the criteria. Of the 36 students, those who scored above the criteria were 34 students or 94.44%. Meanwhile, students who scored below the criteria only 5.56% because they already had self-awareness about the importance of learning in the electric starter motor system. Moreover, the researchers explained the benefits that had been achieved and corrected all the shortcomings and obstacles faced by students in cycle I. In addition, the researchers raised the students' motivation by emphasizing the urgency of the electric starter motor system.

*Student Responses to the Application of the TAI Learning Model*

The student responses to the application of the Team Assisted Individualization of cooperative learning model in a questionnaire (questionnaire) involved 15 students (sample) located in VHS. The results of student responses from 15 items can be presented in Table 7 below.

Table 7. the Students' responses to the application of the TAI learning model

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| No | Indicator | Score | | |
|---|---|---|---|---|
| | | **R** | **SM** | **100%** |
| 1 | Student responses to the application of the TAI learning model | 98 | 120 | 81.67 |
| 2 | Students' material understanding | 94 | 120 | 78.33 |
| 3 | Student activities with the application of the TAI learning model | 99 | 120 | 82.50 |
| 4 | The seriousness of students towards the application of the TAI learning model | 89 | 120 | 74.17 |
| 5 | Students' learning motivation | 82 | 120 | 68.33 |
| 6 | The effectiveness of the TAI learning model | 91 | 120 | 75.83 |
| 7 | Students' opinions about the application of the TAI learning model | 88 | 120 | 73.33 |
| 8 | The improvement of the students' learning outcomes | 46 | 60 | 76.67 |
| | Total | 687 | 900 | 76.33% |

Based on the Table 7, it can be seen that the percentage of students' responses to the application of the Team Assisted Individualization of cooperative learning model used the following formula:

$$NP = \frac{R}{SM} 100\%$$

$$= \frac{687}{900} X\ 100$$

$$= 76.33\%$$

Based on the data on student responses in the field, the overall percentage of the application of the learning model was 76.33% which had reached the criterion score of 60%. It can be concluded that the application of the Team Assisted Individualization type of cooperative learning model applied by the researcher is considered "Good" (agree).

The results of this study are in line with the results of CAR classroom action research that several researchers have carried out. Oone of them is the study from the Automotive Engineering Education Study Program, Faculty of Teacher Training and Education, the University of Muhammadiyah Purworejo entitled "Application of the Teams Assisted Individualization (TAI) Learning Model to Improve Learning Outcomes of Mechanical Measuring Instruments in Class X TKR Students of VHS Pancasila Kutoarjo" (Gusti, et al, 2020). The results of this study reveal the improvement towards students learning outcomes and the percentage of students passing grade X TKR OF VHS Pancasila Kutoarjo with the application of the Teams Assisted Individualization (TAI) learning model in the pre-action, the cycle I and the cycle II. In the pre-action observation, the average score of students was 60.57 with a percentage of students' achievement of 33.33%, in the first cycle the average value of students increased to 72.40 with the percentage of students' achievement of 59.25% and in the second cycle, the average score of students increased to 77.59 with the rate of student passing reached 77.78%, respectively.

Automotive Engineering Education Study Program, Faculty of Teacher Training and Education, University of Muhammadiyah Purworejo entitled "Application of the Teams Assisted Individualization (TAI) Learning Model to Improve Learning Outcomes of Mechanical Measurement Instruments among X TKR Class students of Patriot Vocational School Pituruh in

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the 2014/2015 Academic Year " (Gusti, et al, 2020). This study indicates an escalation of students learning outcomes and the percentage of students passing grade after applying the Teams Assisted Individualization (TAI) learning model in the pre-action, the cycle I and the cycle II. The percentage of student graduation was 33.33% with an average score of 60.57 to 59.25% in the first cycle. The results of 72.40 and 77.78% is for the second cycle with an average value of 77, 59, respectively. It shows an escalation on the average scores of the student learning outcomes. Similarly, the study on the Application of TAI Cooperative Learning Model (to Improve Wheel and Tire Learning Outcomes in Class XI Students TKR SMK Ash-Shiddiqiyah Balingasal Academic Year 2012/2013" (Nugroho, et al, 2013). The results of this study indicate positive effects on students' learning outcomes and the students' passing grades. The improvement of learning outcomes and concept understanding in physics subjects also occurs in IT ABU Middle School BURN Yogyakarta" (Muhtadi, 2009). The application of TAI model also enhances the students' learning outcomes and the percentage of students' graduation. Another study shows that the TAI Cooperative Learning Model can effectively improve the students' interest in the XI mechanical Class in PIRI VHS Sleman" (Tricahyo, 2012). This study also indicates an escalation among students' learning outcomes and the percentage of passing students among the students.

Based on the description above, it can be concluded that the research conducted in VHS with the application of the Teams Assisted Individualization (TAI) learning model can improve students' learning outcomes in the starter motor electrical system. Based on the evaluation results, it was found that the average scores among the student learning outcomes are getting higher. It means that the Teams Assisted Individualization (TAI) learning model can be used as an alternative hat is feasible to be applied in the learning process for teachers to enhance the learning quality.

## CONCLUSIONS

Based on the research results, several conclusions can be drawn: the application of learning using the Team Assisted Individualization (TAI) cooperative model is carried out in the planning, action, and closing stages. The learning implementation using the TAI cooperative model can improve student learning outcomes. The performance of the TAI learning model can improve students' learning outcomes that can be seen from the percentage of students' graduation of 33.33% with an average score of 60.55 is getting higher to 58.33% in the first cycle with an average value of 69.02 and 94.44% in the second cycle with an average value of 78.47, respectively. It indicates the escalation of the average value of the students' learning outcomes by 9.45 and the percentage of students' graduation by 36.11%, respectively.

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