[Research Article]

IMPLEMENTATION OF A PRACTICUM-BASED INQUIRY LEARNING MODEL TO IMPROVE STUDENT LEARNING OUTCOMES ON TEMPERATURE AND HEAT: CLASSROOM ACTION RESEARCH

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ABSTRACT

This study aims to determine the enhancement of student learning outcomes by employing a practicum-based inquiry learning model focusing on temperature and heat. This classroom action research was conducted involving 36 students in grade XI at SMAN 2 Lembang 2022-2023 school year. The instruments consist of tests, questionnaires, and observations were utilized for data collection. Data analysis involved calculating the mean scores for affective, psychomotor, and cognitive domains, along with the percentage of students meeting or surpassing the KKM. Findings revealed improvements in learning outcomes across all domains throughout the pre-cycle, cycle 1, and cycle 2. Furthermore, the percentage of students achieving above the KKM in the cognitive domain, increased from the pre-cycle by 66%, in cycle 1 by 77%, and in cycle 2 by 92%. The teaching and learning implementation scores for cycles 1 and 2 were 3.0 and 3.3 respectively, both of which fall into the high category.

Keywords: Inquiry, Learning Outcomes, Practicum

1. INTRODUCTION

Learning is an activity carried out with the aim of making someone learn. According to Pribadi, B. (2009), learning is a process that is deliberately designed to create learning activities in individuals. Another opinion stated that learning (instruction) is an effort to make students learn or an activity to educate students (Warsita, 2008). Meanwhile, Sadiman (1986) revealed that learning is a planned effort in manipulating learning resources so that the learning process occurs in students. Based on the opinions of these experts, it is possible to conclude that learning is a series of deliberately planned efforts in manipulating learning resources to create learning activities for students with the goal of assisting students in developing themselves in order to find something meaningful for their lives and achieve the highest level of safety and happiness. This goal is in line with the purpose of education according to Ki Hajar Dewantara, which is to guide all the forces of nature that exist in children, so that they as humans and members of society can achieve the highest safety and happiness (Dewantara, 1961). Based on these educational goals, the learning process must be designed in such a way that students experience meaningful learning. In designing a lesson to achieve meaningful learning, teachers must always have strategies that are adapted to the students' needs. One strategy that can be employed is to select the appropriate and effective teaching models.

The learning model is a systematic series of activities that teachers apply to achieve learning objectives. In choosing a learning model, there are many things that must be considered by the teachers, including the condition of the learners, school environment, time, facilities, and materials. In achieving meaningful learning, it is necessary to select teaching models that can provide stimuli so that students can actively utilize their own strengths in discovering something meaningful. One teaching model that can provide stimuli for students to actively discover is the inquiry-based learning model. Kunandar (2010) stated that inquiry-based learning is a learning activity where students are encouraged to learn through their active engagement with concepts and principles, and teachers facilitate students to have experiences and conduct experiments that enable them to discover principles for themselves. Meanwhile, Usman (2005) revealed that inquiry is a method of teaching involving critical, analytical, and argumentative exploration of a subject, using specific steps towards a conclusion. Another opinion suggested that teaching based on inquiry is a student-centred strategy in which groups of inquiry students seek answers to the content of questions through clearly outlined procedures and group structure (Hamalik, 2006). Therefore, it can be concluded that the inquiry learning model is a lesson delivery activity using steps where students are actively involved to examine by searching critically, analysing, and arguing the answers to questions through a clear procedure.

The goal of inquiry-based learning, according to Suyadi (2013), is to help students in developing intellectual discipline and thinking skills by posing questions and obtaining answers to their curiosity. Meanwhile, Sanjaya (2006) described six steps in implementing inquiry, namely: orientation, formulating the problem, formulating hypotheses, collecting data, testing hypotheses, formulating conclusions. Based on these steps, there is a step of collecting data. The data collection process aims to enable students to use the power of their nature to find everything they need for themselves. As facilitators, teachers should consistently design learning experiences that align with the requirements of their students. In designing learning for the process of collecting data, a method is needed that can provide opportunities for learners to test and carry out their own searches for everything needed to test hypotheses. One of the methods that can provide opportunities for learners to test and carry out themselves is the practicum method.

Practicum comes from the word praktik, which means the real implementation of something mentioned in theory. According to the *Kamus Besar Bahasa Indonesia* (KBBI), the definition of practicum is part of teaching which aims to give students the opportunity to test and implement. Based on terminology, Subiantoro (2010) stated that practicum can be interpreted as a

series of activities that allow a person (student) to apply skills or practice something. In other words, in practicum activities it is possible to apply various scientific process skills as well as the development of scientific attitudes that support the process of knowledge acquisition (scientific products) in students. Therefore, practicum holds a very important position in science learning that can support students' understanding of the subject matter (Nurhidayati, 2016). In addition, practicum activities can improve the ability to organise, communicate, and interpret observations (Nulhakim, 2004). According to Rustaman (2003), practicum is often associated with several objectives, such as motivating, teaching basic scientific skills, improving concept understanding, understanding and using scientific methods, and developing scientific attitudes. Both the use of models and methods are efforts made by teachers so that students are able to achieve learning objectives effectively. Generally, learning objectives can be formulated in the form of behaviors, specific competencies, actual and measurable, and mastered by students after participating in certain learning activities. To assess whether students have achieved learning objectives, it can be done by analysing their learning outcomes. Mustakim (2020) argued that learning outcomes are everything achieved by students with certain assessments established by the curriculum. According to Amir & Risnawati (2015), learning outcomes are the abilities acquired by students after engaging in learning activities. Meanwhile, Suprijono (2015) revealed that learning outcomes are patterns of behavior, values, understandings, attitudes, appreciations, and skills. Bloom (as cited in Suprijono 2015) further stated that learning outcomes comprise cognitive, affective, and psychomotor abilities.

The domains of learning outcomes according to Bloom are used as a reference for assessment in the learning process at SMA Negeri 2 Lembang. On the occasion of the PPG Pre-service field experience practice, the researcher obtained data on learning outcomes in the cognitive domain in class XI MIPA 3 SMA Negeri 2 Lembang in the 2022-2023 school year, namely the acquisition of an average score of 77 and as

many as 12 students scored below the minimum completeness criteria or only 66% of students who had scored above the KKM. Based on this description, the researcher formulated a study with a class action research method entitled application of a Practicum-Based Inquiry model in class XI MIPA 3 SMA Negeri 2 Lembang to improve learning outcomes.

2. METHOD

The research method used is the Classroom Action Research method or usually called *Penelitian Tindakan Kelas* (PTK). Classroom Action Research is a method of teachers in managing the learning process in the classroom with the aim of improving the quality of learning in the classroom. According to Kemmis and Mc. Taggart in Iskandar, et al. (2015), PTK is a form of self-reflection investigation conducted by researchers in social situations (including education) to improve rationalisation and social justice or practice, understanding of practice, the situation in which practice takes place. This is very rational for researchers to collaborate, although it is often done alone and sometimes done with others. Classroom action research has procedures or rules that need to be considered. In this study, the procedures used refer to the research implementation process proposed by Kemmis and Mc. Taggart (2015), includes: 1) planning; 2) acting; 3) observing; and 4) reflecting. The flow of classroom action research used is described in Figure 1.
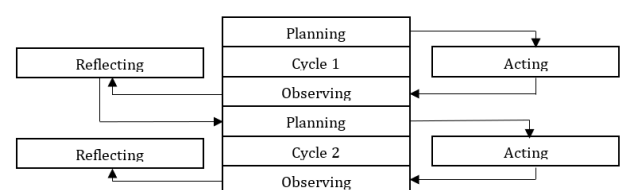

Figure 1. Classroom Action Research Flow

The steps done in this research are:
1) Planning. Before the research is carried out, what must be done is to prepare an action plan, namely:
   a) choosing a class that will be used as a place to conduct research.

b) reviewing the curriculum of physics subjects in class XI to find out the basic competencies.

c) developing a general design of learning, assessment instruments to collect data, which is related to the syllabus of learning lesson plans, learning materials and student worksheets.

d) compile and prepare observation sheets about the implementation of learning.

e) compile and prepare a questionnaire to find out the advantages and disadvantages of implementing learning according to students.

2) Acting. In this study, the planned actions were implemented through the learning process divided into 2 cycles as follows.
   I. The activities carried out in cycle 1 are:
   a) develop a lesson plan based on the results of reflection on previous learning activities.
   b) observing the learning process using the format provided.
   c) carry out research collaboratively involving other teachers as observers to obtain data on teacher and student activities during the learning process.
   d) carry out learning evaluations in the form of tests to measure the level of understanding of students.
   e) carry out reflection in the form of formulations of problems that must be overcome in action planning to overcome them in cycle 2.
   II. The activities carried out in cycle 2 are:
   a) arranging learning based on the results of reflection on cycle 1 and implementing learning activities in accordance with the action plan.
   b) carry out observations of the learning process using the format that has been provided.
   c) carry out research collaboratively involving other teachers as observers to obtain data on teacher and student activities during the learning process.
   d) carry out learning evaluations in the form of tests to measure the level of understanding of students.

e) carry out reflection in the form of formulations of problems that must be overcome along with action planning to overcome them.

3) Observating. The observating stage is carried out together during the implementation of the action. At this stage, a direct observation of the implementation of learning is carried out in each action. Observation activities are activities to recognise, record and document every aspect of the process and the results achieved from the planned activities. Observation activities are carried out with the aim of knowing whether there are changes that occur with the actions that take place.

4) Reflecting. The reflecting stage is an activity of analysis-synthesis, interpretation, and explanation (explanation) of all data obtained during the ongoing action. The aspects analysed are the effectiveness of learning, learning methods, the use of media in learning, evaluation and the results of field notes.

In carrying out the stages of class action research, researchers use various methods to collect data. It should be noted that class action research has two types of data, according to Iskandar, et al. (2015) stated as follows:

a. Qualitative Data. Qualitative data contains explanatory sentences taken from the results of observations of researchers on students during learning activities and the results of observer's observations on learning activities carried out by researchers analysed by percentage descriptions and grouped by category.

b. Quantitative Data. Quantitative data in the form of numbers taken from the evaluation results after learning is processed using descriptive percentage techniques. The value is analysed based on the achievement of students, namely the highest, lowest, total, class average and completeness. In the research, data collection was carried out using observation, test, and questionnaire techniques. Observation is a way of collecting data through a systematic process

of recording the behaviour of subjects (people), objects (things) or events without any questions or communication with the individuals studied. Observation includes everything related to the observation of behavioural and non-behavioural activities or conditions (Sanusi, 2017). Observation will be carried out during the learning process. Observations were carried out by 4 observers. The instrument used is an observation sheet for assessing the implementation of learning. In addition, observations were also made by the teacher in assessing affective and psychomotor aspects during the learning process. The instruments used were affective observation sheets and psychomotor observation sheets. In addition, affective and psychomotor assessments are also carried out by self-assessment and peer assessment. The instruments used are self-assessment sheets and assessment sheets between friends. Another method used by researchers is the test method. As for the instruments used in the form of multiple choice tests. Completion of test questions is carried out after the implementation of learning in each cycle. Another method used is a questionnaire to find out the implementation of learning according to students. The instrument in the form of a questionnaire sheet is given to students after learning takes place for each cycle.

The score of the instrument in the form of a questionnaire is calculated using the following formula.

$$Learning\ implementation = \frac{average\ number\ of\ aspects\ implemented}{number\ of\ aspects\ observed} \quad (1)$$

The learning implementation value is then interpreted based on the categories in Table 1 below.

Table 1. Categories of learning implementation

Interval	Category
3,50 < x ≤ 4,00	Very high
2,50 < x ≤ 3,50	High
1,50 < x ≤ 2,50	Medium
0 < x ≤ 1,50	Low

All stages will be carried out with the subject, namely 36 students in class XI MIPA 3 SMA Negeri 2 Lembang in the 2022-2023 academic year. While the research implementation time is in the even semester of the 2022-2023 academic year.

3. RESULT AND DISCUSSION

The results of the research obtained include the results of observations of learning implementation by 4 observers, the results of observations of affective abilities by teachers, the results of observations of psychomotor abilities by teachers, the results of self-assessment on affective and psychomotor aspects, the results of peer assessment on affective and psychomotor aspects, the results of multiple choice question tests, and the results of the learning implementation questionnaire according to students.

3.1 Pre cycle
Pre-cycle is the time before the learning cycle is held in PTK research. The pre-cycle obtained data on the ability of students in class XI MIPA 3 SMA Negeri 2 Lembang. The data obtained consists of an average of affective, psychomotor, and cognitive assessments. The data is presented in Table 2 below.

Table 2. Average Pre cycle Learning Outcomes

Learning Outcome Domains	Average score
Affective	89
Cognitive	77
Psychomotor	80

From a total of 36 students, it was found that 12 students had scores below the minimum completeness criteria in the cognitive aspect. The value of the minimum completeness criteria is 75. If a percentage is made, 66% of students who have received scores above the minimum completeness criteria.

3.2 Cycle 1
The results of PTK in cycle 1 are described as follows.

1) Cycle 1 lesson planning was conducted with the following steps:

a. Choosing a class that will be used as a place to conduct research. The class chosen was class XI MIPA 3, which is a class that is in accordance with the division of tasks from the school to researchers. In class XI MIPA 3, the researcher has made observations about the characteristics of students and analysed the learning outcomes before the cycle is implemented.

b. Reviewing the curriculum of physics subjects in class XI to find out the basic competencies. The basic competencies used are KD 3.5 Analyse the effect of heat and heat transfer which includes thermal characteristics of a material, capacity, and conductivity of heat in everyday life and KD 4.5 Design and conduct experiments on the thermal characteristics of a material, especially related to capacity and conductivity of heat, along with the presentation of experimental results and their utilization. The selection of basic competencies is adjusted to the time allocation that has been designed in the yearly programme and semester programme.

c. Develop a general design of learning, assessment instruments to collect data, which is related to the learning syllabus of lesson plans, learning materials and student worksheets. Learning tools made in the form of lesson plans which in part contain learning steps based on the syntax of the inquiry learning model according to Wina Sanjaya. Assessment instruments made in the form of observation sheets, namely observation sheets that will be used by teachers to assess affective and psychomotor aspects and observation sheets that will be used by students to assess cognitive, affective, and psychomotor aspects on self-assessment sheets and assessment of affective and psychomotor aspects on peer assessment sheets. Another instrument that was also made was a test instrument in the form of multiple choice questions to assess cognitive abilities. In addition, LKPD was made as an instrument for psychomotor assessment.

d. Developing and preparing observation sheets about learning implementation. Researchers made observation sheets of learning implementation for four observers who would carry out observations during learning.

e. Compile and prepare a questionnaire to find out the advantages and disadvantages of implementing learning according to students. Researchers made a questionnaire regarding student's responses to learning implementation.

2) The implementation of cycle 1 learning was carried out on Tuesday 9 May 2023 in class XI MIPA 3 SMA Negeri 2 Lembang. Learning discusses Heat topics for 2 lesson hours, namely 2 x 45 minutes in 1 meeting. Learning activities are divided into 3 stages, namely introductory activities, core activities, and closing activities. The number of students who take part in learning is 36. The following are the stages carried out in the learning process:

a. Introduction. The teacher opens the learning with greetings, gives time for prayer, checks the attendance of students, conducts non-cognitive diagnostic assessments by asking how students feel at that time, gives feedback on students' answers related to their feelings, and makes apperceptions related to heat and then confirms.

b. Core. The following is the syntax of inquiry learning:
   - Orientation
     Learners listen to information about the objectives and material to be learned. Learners see video displays of melting ice and boiling water. Learners answer triggering questions related to the video. Learners are directed to raise problems based on events in the video.
   - Problem formulation
     Learners are asked to get into groups. Learners receive LKPD. Learners formulate problems based on teacher guidance through triggering questions and record them on the LKPD.
   - Hypothesis Formulation
     Learners are guided to make hypotheses based on the formulation of the problem that has been made. Then write it on the LKPD.
   - Data Collecting

Learners receive information related to safety procedures for the use of tools Learners then take their own tools and materials needed by the group. Learners perform lab work to obtain data that will be analysed to answer the hypothesis.

- Hypothesis Testing
  Learners analyse the data obtained from practicum, Learners test the hypothesis they have proposed with the results of data analysis obtained from practicum.
- Drawing Conclusions
  Learners are guided to make conclusions based on the results of data analysis and hypothesis testing.

c. Closing. Some groups present the results of the discussion in front of the class. Learners receive confirmation related to the results of the discussion from the teacher. Learners are given the opportunity to ask questions. Learners work on exercise questions. Learners receive confirmation of the discussion of the exercise questions. Learners make conclusions and reflect on learning. Learners are given time to pray. The teacher closes the lesson with greetings.

3) Observation of the implementation of learning cycle 1 was carried out by 4 observers during the learning process. In addition to the implementation, it is also seen from the questionnaire given to students. For affective assessment, it is obtained from the average teacher observation assessment, self-assessment, and peer assessment. For psychomotor assessment obtained from teacher observation assessment, LKPD assessment, self-assessment, and assessment between friends. Meanwhile, the cognitive assessment is obtained from the average self-assessment and test results.

a. Observation results of learning implementation. Based on the observations made by 4 observers, the following data were obtained:
- The teacher carried out the introduction stage and the core stage according to the plan in the lesson plan.

- The closing stage was not fully implemented due to time constraints. The time needed to carry out the practicum exceeded the planned time allocation so the teacher decided to complete the core stage but not all closing stages were carried out. The activities in the closing stage that were not carried out were confirming the discussion of exercise questions and providing opportunities for students to ask questions.
- The teacher observes learning activities from beginning to end and provides assessment during learning.
- There were two learners in one group who did not focus on the learning process. The teacher repeatedly gave directions to refocus to work on tasks according to the division but the two learners still could not focus. Finally, the teacher provided a separate LKPD for the two learners, and the result was that the two learners could focus on working on the LKPD with their group mates.
- There are still two groups that impose the task of working on LKPD on one of the high ability learners.
- There were some students who used the lab equipment incorrectly.
- There was one group that was still unsure about the problem formulation that their group made, so their group asked the teacher. The other groups were able to formulate the problem appropriately. The teacher checked each group's problem formulation.
- All groups have been able to propose hypotheses.
- The teacher guides learners during data collection. Learners analyse data and make conclusions with teacher guidance in each group.
- The length of the problem is as planned.

b. Students' questionnaire results on learning implementation. Based on the questionnaire results, the learning implementation value is 3,00 with the High category. This shows that the learning that has been carried out is classified as effective.

c. Cognitive, affective, and psychomotor assessment results. Table 3 shows the data

obtained regarding cognitive, affective, and psychomotor assessments in cycle 1.

Table 3. Average Cycle 1 Learning Outcomes

Learning Outcome Domains	Average score
Affective	92
Cognitive	82
Psychomotor	86

From a total of 36 students, it was found that 8 students still had scores below the minimum completeness criteria in the cognitive aspect. If a percentage is made, as many as 77% of students have received scores above the minimum completeness criteria.

4) Reflection. At this stage of reflection, there are several things that teachers must pay attention to in further learning based on the problems encountered in cycle 1. The things that must be followed up include the following:
   - Teachers need to manage the use of time so that each stage of learning implementation can be carried out in accordance with the lesson plan.
   - The teacher further emphasises the use of practical tools so that the practicum time is in accordance with the planned allocation and there are no more students who mistakenly use practical tools.
   - More than 1 LKPD sheet is needed for each group so that there are no more groups that charge the work to only one person.
   - It is necessary to divide the tasks in each group more clearly so that each student gets a task and can be responsible for doing the task so that each student can focus on learning.
   - The average results of affective assessment have increased from the pre-cycle score from 89 to 92. While the psychomotor assessment has increased from 80 to 86. And for the average value of cognitive increased from 77 to 82. This shows that learning is able to improve learning outcomes in all three aspects.

- The percentage of the number of students who are already above the minimum completeness criteria is still less than 80%, so it is necessary to continue to the cycle 2.

3.3 Cycle 2
The results of PTK in cycle 2 are described as follows.

1) Cycle 1 lesson planning was conducted with the following steps:
a. Choosing a class that will be used as a place to conduct research. The class chosen was XI MIPA 3, which was the class used in cycle 1.
b. Reviewing the curriculum of physics subjects in class XI to find out the basic competencies. The basic competencies used are KD 3.5 Analyse the effect of heat and heat transfer which includes thermal characteristics of a material, capacity, and conductivity of heat in everyday life and KD 4.5 Design and conduct experiments on the thermal characteristics of a material, especially related to capacity and conductivity of heat, along with the presentation of experimental results and their utilization. The selection of basic competencies is adjusted to the time allocation that has been designed in the yearly programme and semester programme.
c. Develop a general design of learning, assessment instruments to collect data, which is related to the learning syllabus of lesson plans, learning materials and student worksheets. Learning tools made in the form of lesson plans which in part contain learning steps based on the syntax of the inquiry learning model according to Wina Sanjaya. Assessment instruments made in the form of observation sheets, namely observation sheets that will be used by teachers to assess affective and psychomotor aspects and observation sheets that will be used by students to assess cognitive, affective, and psychomotor aspects on self-assessment sheets and assessment of affective and psychomotor aspects on peer assessment sheets. Another instrument that was also made was a test

instrument in the form of multiple choice questions to assess cognitive abilities. In addition, LKPD was made as an instrument for psychomotor assessment.

d. Developing and preparing observation sheets about learning implementation. Researchers made observation sheets of learning implementation for four observers who would carry out observations during learning.

e. Compile and prepare a questionnaire to find out the advantages and disadvantages of implementing learning according to students. Researchers made a questionnaire regarding students' responses to learning implementation.

2) The implementation of cycle 2 learning was carried out on Thursday 11 May 2023 in class XI MIPA 3 SMA N 2 Lembang. Learning discusses Black's Azas for 2 lesson hours, namely 2 x 45 minutes in 1 meeting. Learning activities are divided into 3 stages, namely introductory activities, core activities, and closing activities. The number of students who take part in learning is 36. The following are the stages carried out in the learning process:

a. Introduction. The teacher opens the lesson with greetings, gives time for prayer, checks the attendance of students, conducts non-cognitive diagnostic assessment by asking how students feel at that time, gives feedback on students' answers related to their feelings, and makes apperception related to heat then confirms.

b. Core. The following is the syntax of inquiry learning:
   - Orientation
     Learners listen to information about the objectives and material to be learned. Learners see a video display of lava and ice cubes. Learners answer lighter questions related to the video. Learners are directed to raise problems based on events in the video.
   - Problem Formulation
     Learners are asked to get into groups. Learners receive LKPD. Learners formulate problems based on teacher guidance through sparking questions and record them on LKPD.

   - Hypothesis Formulation
     Learners are guided to make hypotheses based on the formulation of the problem that has been made. Then write it on the LKPD.
   - Data Collecting
     Learners receive information related to safety procedures for using tools. The teacher emphasizes how to use the lab equipment. Learners then take their own tools and materials needed by the group. Learners carry out practicum to obtain data that will be analyzed to answer the hypothesis.
   - Hypothesis Testing
     Learners analyze the data obtained from practicum, Learners test the hypothesis they have proposed with the results of data analysis obtained from practicum.
   - Drawing Conclusions
     Learners are guided to make conclusions based on the results of data analysis and hypothesis testing.

c. Closing. Some groups present the results of the discussion in front of the class. Learners receive confirmation related to the results of the discussion from the teacher. Students are given the opportunity to ask questions. Students work on exercise questions. Learners receive confirmation of the discussion of the exercise questions. Learners make conclusions and reflect on learning. Learners are given time to pray. The teacher closes the lesson with greetings.

3) Observation of the implementation of cycle 2 learning was carried out by 4 observers during the learning process. In addition to implementation, it is also seen from the questionnaire given to students. For affective assessment obtained from the average teacher observation assessment, self-assessment, and assessment among friends. For psychomotor assessment obtained from teacher observation assessment, LKPD assessment, self-assessment, and assessment between friends. As for the cognitive assessment, it is obtained from the average self-assessment and test results.

a. Observation results of learning implementation. Based on the observations made by 4 observers, the following data were obtained:
  - The teacher carried out all stages according to the plan in the lesson plan.
  - The teacher observes learning activities from beginning to end and provides assessment during learning.
  - Each learner gets a clear division of tasks, as for the division of tasks written on LKPD.
  - Each learner collaborates in the group in carrying out practicum and discussion.
  - All groups have been able to formulate problems, propose hypotheses, and analyze data and make conclusions.
  - There was one group that did the practicum interspersed with joking. The teacher asked the group to be careful using the practicum tools. Although the learning was done with jokes, the group became the best group in doing the practicum and got maximum results.
  - The length of the problem is as planned.
b. Student's questionnaire results on learning implementation. Based on the questionnaire results, the learning implementation value is 3,30 with the High category. This shows that the learning that has been carried out is classified as effective.
c. Cognitive, affective, and psychomotor assessment results. Table 4 shows the data obtained regarding cognitive, affective, and psychomotor assessments in cycle 2.

Table 4. Average Cycle 1 Learning Outcomes

Learning Outcome Domains	Average score
Affective	95
Cognitive	87
Psychomotor	90

From a total of 36 students, it was found that 3 students still had scores below the minimum completeness criteria in the cognitive aspect. If a percentage is made, as many as 92% of students have received scores above the minimum completeness criteria.

4) Reflection. At this reflection stage, several things were obtained that the teacher should pay attention to in further learning based on the problems encountered in cycle 1. The things that must be followed up include the following:
  - The average results of affective assessment have increased from the value of cycle 1, namely from 92 to 95. While the psychomotor assessment increased from 86 to 90. And for the cognitive average score increased from 82 to 87. This shows that learning in cycle 2 is able to improve learning outcomes in all three aspects.
  - The percentage of the number of students who are above the minimum completeness criteria has reached 92%, this shows that the research has reached the performance indicators so that no stage is needed to the next cycle.
  - It is necessary to analyze the characteristics of students in the division of groups. For example, with a group whose practicum is interspersed with jokes but succeeds, it must be analyzed further. It is possible that the group is learners who have a kinesthetic learning style. Further assessment is needed for grouping either based on learning style or initial ability or other characteristics so that students undergo learning happily and get maximum results. Thus teachers can plan differentiated learning.

Based on the results of the research obtained, the results show that the implementation of learning in cycle 1 and cycle 2 based on students' questionnaires is already in the high category, which means that the implementation of learning is effective. As for the observations of the four observers in cycle 1 there are still some things that need to be improved by the teacher while in cycle 2 an action plan is needed to implement differentiated learning. Based on the results of the participant's questionnaires and the observations of the four observers, it can be concluded that learning with the practicum-based inquiry model that has been designed has been carried out effectively. Stage by stage of the syntax of the inquiry learning

model with the practicum method can already be implemented. As for the data on learning outcomes both pre-cycle, cycle 1, and cycle 2 on affective, psychomotor, and cognitive aspects can be seen in the graph shown in Figure 2 below.
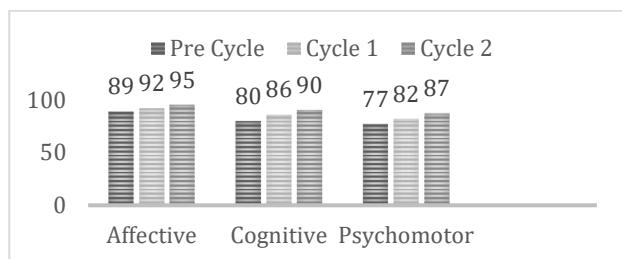

Figure 2. Average Learning Outcomes of Pre Cycle, Cycle 1, and Cycle 2

Based on the graph, it can be seen that the learning outcomes obtained continue to increase. The increase occurred in every aspect of the pre-cycle, cycle 1, and cycle 2. The data regarding the percentage of students who have been able to get scores above the minimum completeness criteria from pre-cycle, cycle 1, and cycle 2 are shown in Figure 3 below.
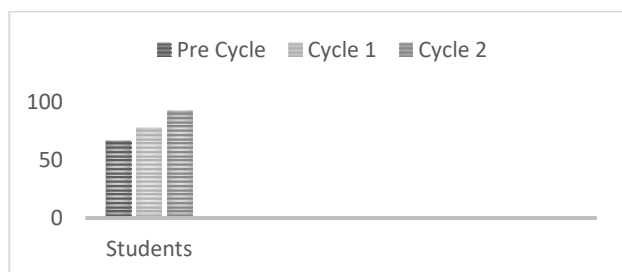

Figure 3. Percentage of Number of Learners with Cognitive Assessment Above KKM

Based on the graph, it can be seen that the percentage of students who get scores above the minimum completeness criteria continues to increase from par cycle, cycle 1, and cycle 2. At the end of cycle 2 the percentage obtained was 92% so that the researcher concluded that the research had reached the performance indicators so that no stage was needed to the next cycle.

4. CONCLUSION

Learning with a practicum-based inquiry model in this study can be carried out effectively, this can be seen based on the acquisition of a questionnaire assessment of the implementation of learning from students and the results of observations of four observers during the learning process. The results of learning that want to be improved are learning outcomes. The learning outcomes obtained are an assessment of the affective, psychomotor, and cognitive aspects. Assessment of affective aspects is carried out by teacher observation assessment, self-assessment, and peer assessment. Assessment of psychomotor aspects is carried out by teacher observation assessment, self-assessment, peer assessment, and LKPD. While cognitive aspects are obtained from self-assessment and test results in the form of questions. As for the results in the affective aspect, there is an increase in the average, namely from the pre-cycle value of 89 then in cycle 1 of 92 and in cycle 2 of 95. The results obtained for the psychomotor aspect are from the pre-cycle value of 80 then in cycle 1 of 86 and in cycle 2 of 90. As for the cognitive aspect, the average value is obtained from the pre-cycle value of 77 then in cycle 1 of 82 and in cycle 2 of 87. In addition, the percentage of the number of students who scored above the minimum completeness criteria on the cognitive aspect also increased from pre-cycle which was only 66% then in cycle 1 by 77% and in cycle 2 by 92%. Based on these results it can be concluded that the application of the practicum-based inquiry model in class XI MIPA 3 SMA Negeri 2 Lembang in the 2022-2023 school year can improve learning outcomes. Based on the data obtained and the results of the analysis, it can be concluded that the learning that has been carried out is learning using a practicum-based inquiry learning model with implementation in the high category. The implemented practicum-based inquiry learning can increase the average student learning outcomes in affective, psychomotor, and cognitive aspects. The average acquisition for affective aspects is obtained from teacher observation assessment, self-assessment, and peer assessment. The average acquisition of learning outcomes in psychomotor aspects is

obtained from teacher observation assessment, self-assessment, assessment among friends, and LKPD. While the average assessment on cognitive aspects is obtained from self-assessment and test results in the form of questions. In addition to improving learning outcomes, practicum-based inquiry learning is also able to increase the percentage of students who score above KKM in cognitive aspects.

5. REFERENCES

Amir, Z, & Risnawati. (2015). Psikologi Pembelajaran Matematika. Yogyakarta: Aswaja Pressindo.

Departemen Pendidikan Nasional. (2012). Kamus Besar Bahasa Indonesia Pusat Bahasa Edisi Keempat. Jakarta: Kementerian Pendidikan dan Kebudayaan.

Dewantara, Ki Hajar. (1961). Ilmu Pendidikan. Yogyakarta: Taman Siswa

Hamalik, O. (2006). Teknologi dalam Pendidikan. Bandung: Yayasan Partisipasi Pembangunan Indonesia.

Iskandar, Dadang, & Narsim. (2015). Penelitian Tindakan Kelas dan Publikasinya Untuk Kenaikan Pangkat dan Golongan Guru & Pedoman Penulisan PTK bagi Mahasiswa. Cilacap: Ihya Media.

Kunandar. (2010). Guru Profesional. Jakarta: Rajawali Press.

Mustakim. (2020). Efektivitas Pembelajaran Daring Menggunakan Media Online Selama Pandemi Covid-19 Pada Mata Pelajaran Matematika, *Journal of Islamic Education, 2(1)*, 1-12

Nulhakim, L. (2004). Kemampuan berkomunikasi dan bekerjasama ilmiah siswa SMA pada kegiatan praktikum dengan model pembagian tugas (model Wheater dan Dunleavy tipe 2). *Jurnal Pendidikan Biologi IKIP PGRI Semarang*, 143- 150

Nurhidayati. (2016). Analisis Pelaksanaan Praktikum pada Pembelajaran Biologi Peserta Didik Kelas XI di SMAN 7 Bandar Lampung Tahun Pelajaran 2015/2016. Skripsi, Fakultas Tarbiyah dan Keguruan: IAIN Raden Intan Lampung.

Pribadi, B. (2009). Model Desain Sistem Pembelajaran. Jakarta: PT. Dian Rakyat.

Rustaman, A. (2003). Strategi Belajar Mengajar Biologi. Bandung: FMIPA UPI.

Sadiman, A., dkk. (1986). Media pendidikan, pengertian, pengembangan dan pemanfaatan. Jakarta: Rajawali.

Sanjaya, W. (2006). Strategi Pembelajaran. Jakarta: Kencana Prenada Media Group.

Sanusi, A. (2017). Metodologi Penelitian Bisnis. Jakarta: Salemba empat.

Subiantoro, A.W. (2010). Pentingnya Praktikum dalam Pembelajaran IPA. *Prosiding Kegiatan PPM "Pelatihan Pengembangan Praktikum IPA"*, Universitas Negeri Yogyakarta.

Suprijono, A. (2015). Cooperative Learning. Yogyakarta: Pustaka Belajar.

Suyadi. (2013). Strategi Pembelajaran Pendidikan Karakter. Bandung : Remaja Rosdakarya.

Usman. (2005). Proses Belajar Mengajar. Bandung : Remaja Rosdakarya.

Warsita, B. (2008). Teknologi Pembelajaran: Landasan &Aplikasinya. Jakarta: Rinek