



Effect of The Guided Inquiry Learning Model Assisted by Scientific Worksheets on Student's Competence

Desman Faeri Harefa¹, Yurnetti^{1*}

¹ Department of Physics, Universitas Negeri Padang, Jl. Prof. Dr. Hamka Air Tawar Padang 25131, Indonesia

Corresponding author. Email: yurnetti@fmipa.unp.ac.id

ABSTRACT

Inventive learning models and student-centered learning tools have not been used to the fullest, this is reinforced by the results of the observations carried out which prove that student competence is low even though they are accustomed to doing the learning process in the form of groups. the results of observations become the basis of research Guided inquiry learning with Scientific worksheets used to determine the effect of the use of physics class competency models. This study used a quasi-experimental design with randomised Control Group Only Design. Samples were selected using the cluster random sampling technique. Data was collected in the form of knowledge competence, attitudes, and skills. The results showed that the knowledge evaluation of the experimental sample was 81.11 and the control sample was 64.47. The average value of attitude competence for the experimental class was 90.48 and for the control class was 84.01. For skills, the average value of the experimental group was 87.32 and the control group was 77.72. The calculated t value for the three aspects is greater than the t table value which indicates that the hypothesis is accepted. This proves that the use of a guided inquiry learning model assisted by worksheets can affect student competence.

Keywords: Guided Inquiry Learning Model, Scientific Worksheet, competence..



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I. INTRODUCTION

Education is an aspect that affects the progress of the nation. Education aims to create a generation that is civilized, creative, has broad insight, and is useful in the surrounding environment[1]. In Law No. 20 of 2003 on the national education system, education is a conscious and planned action in realizing the conditions process of growth and development allow students to actively develop their abilities. which is needed individually, by society, the nation, and the state[2]. Education is grouped into several fields, one of which is Physics. Physics is a branch of science that has a major contribution to human civilization. Physics knowledge is obtained through scientific steps in the form of scientific methods, so that the physics learning process involves the process of discovery, analysis, and understanding of events in the universe[3]. Physics is not a subject for memorization, but a lesson that develops a way of thinking, processing, and scientific behavior[4]. An ideal condition in physics learning is a learning process that attracts the enthusiasm of students and teachers to achieve the predetermined targets [5]. The aim of physics learning is to improve the ability to make assumptions, process information, and act scientifically. An ideal learning process involves the teacher as a guide, while students are the active participants [6].

The Indonesian government has made efforts to improve the quality of education by regulating the learning process, such as curriculum reform. The 2013 curriculum is a student-centered curriculum that aims to create an interactive learning process[7]. In the 2013 curriculum at the high school level, there are compulsory and specialized lessons[8]. Physics is a subject offered in the math and natural science specialization classes.

The importance of physics in life, in various ways pursued by the government, schools, and teachers in the learning process has been done, one of which is to implement group work in ongoing learning, but the reality in the field is not as expected. Based on the observations made, there are problems found in the physics learning process, namely 1). Lack of use of innovative models in learning. 2). Based on the results of the observation

carried out, there are problems obtained, namely the value of student knowledge does not meet the minimum completeness criteria, students consider physics a complicated lesson, practical activities or demonstrations are rarely carried out and in the learning process do not use student worksheets to facilitate independent activities of students, the following are the results of the analysis of knowledge competency scores based on the results of the observation.

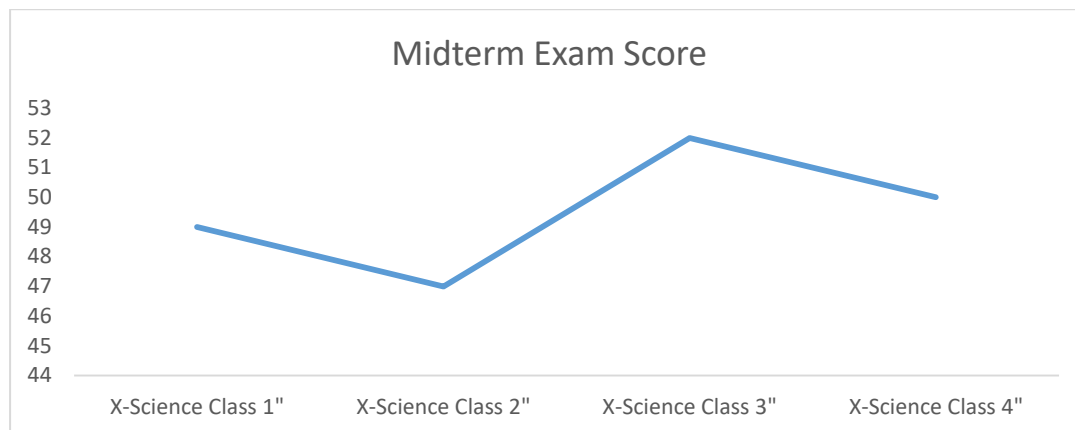


Fig I. Midterm Exam score.

The results of the questionnaire analysis carried out obtained data that 61% of students are interested in learning physics, but 90% of learning implementation does not use student worksheet media based on a scientific approach, this indicates that the lack of management of teaching materials and unstructured learning activities that focus on students.

The solution that will be carried out in the description of the problem above is the application of the guided inquiry learning model assisted by scientific student worksheets. This strategy requires students to be able to work creatively, actively so that it can increase the competence of students[9]. Guided inquiry is a model that applies the process of investigation and discovery of problems with systematic steps so that students are expected to be active during the learning process. The learning process to be interactive is determined by the learning model. The inquiry learning model is a model that gives students time to investigate problems independently[10]. The use of guided inquiry models is in line with the use of the scientific worksheets.

The syntax of guided inquiry is: 1). Finding a problem. 2) make a hypothesis. 3) test the hypotheses 4) make conclusions [11] students learn to categorize a problem, analyze the possible causes of the issue, and then test whether the analysis is correct. The advantages of the guided inquiry learning model are: 1).The inquiry model also provides students with freedom in the process of investigation. 2).This learning model is also in accordance with modern learning needs where the learning process is a change in behavior due to experience. 3).Does not limit the learning process of students

The use of specialized approaches is directly proportional to guided inquiry learning. The expected learning principle is the same, which is student-centered [12], so that it has the same goal of increasing students' abilities independently and can be used in everyday life. A scientific approach is an approach that includes the process of observing, questioning, trying, associating, and communicating which aims to train ways of thinking and familiarize students with activeness in the learning process [13]. This will lead to students who can work independently and in groups with a scientific attitude.

innovative learning is learning that deals directly with finding solutions to problems that have the target of positively and spontaneously increasing the talents and potentials in a class. Based on this, students are expected to be able to adjust to the process, the strategies used in problem-solving as well as the ability to read the situation in the surrounding environment. Implementation of innovative learning models using learning tools. Learning tools are instruments or tools for the process of transferring knowledge [14]. Learning tools that are set to be applied to the learning process are: Syllabus, lesson plans, learning media.

Learning media is an instrument that can stimulate the learning process so that interaction can occur to achieve learning goals [15]. An example of media applied in learning is student worksheets. Learner worksheets (worksheets) are instruments that can make students active and interact in the process of transferring knowledge, thereby increasing students in improving learning achievement. worksheets contains a task sheet and a series of

activities that students do and fill in during the learning process so that it can stimulate the ability of action, skills and knowledge of students in the learning process.

The achievement of learning objectives can be seen in the competence of students which consists of three aspects, namely skills, attitudes and knowledge. Knowledge competence is obtained by written tests while attitude and skill competence through observation sheets in each meeting. This research is directed at investigating the effect of using the guided inquiry learning model aided by scientific worksheets on the competence. So the research hypothesis is formulated, namely H1 "There is an effect of the application of the guided inquiry learning model assisted by scientific worksheets on the competence".

II. METHOD

The research method applied to the study is quasi-experiment, quasi-experimental research serves to obtain information from conditions that are impossible to control and manipulate from related variables [16]. The research design used was a Randomized Control Group Only Design, with two classes, namely the experimental class, and the class that was given action using the guided inquiry learning model assisted by the Scientific worksheets. The control class applies guided inquiry using learning resources at school.

Table 1. Research design

| Class | Treatment | Posttest |
|------------|-----------|----------|
| Experiment | X | T |
| Control | - | T |

(source : Ref [17])

Table 1, X is a treatment or action by applying the guided inquiry learning model assisted by scientific worksheets and T is a posttest conducted on the sample class. Class X - MIPA SMA Pertiwi 1 Padang which is registered in semester 2 TP. 2022/2023 is the research population. How to filter the sample with cluster random sampling technique because the division of classes is not based on superior classes, which are sampled not individuals but groups (classes), the classes that are sampled are class X-MIPA 1 and class X-MIPA 2.

The variable in this discussion is something determined by the researcher that will be observed, obtained information, and become a reference in drawing conclusions. The variables used in this research are: free, control, and dependent. Independent variables can control other factors. The dependent variable is influenced by the independent variable, learner competence is the dependent variable. Control variables are variables that are the same in the sample class, the material used, the time allocation, and the number of questions tested in the sample class is the same.

Classification of data desired in the study is data on knowledge, attitudes, and skills. New data is information obtained directly in the research used as the main explanation. Knowledge data is obtained by conducting a posttest conducted by the sample class, skill data is obtained through a work performance observation sheet, and attitude data is obtained through an observation sheet conducted every meeting.

Research instruments are tools that function to collect research data with steps that have systematic [18]. The instruments in this study include aspects of skills, attitudes, and knowledge. The use of the T-test in data processing is carried out by conducting a normal and variance test first. The normality test to get information on the sample class is normal, if $L_0 < L_t$. Homogeneous test applies the F test if $F_h < F_t$ then the sample is declared homogeneous. The next step is to test the hypothesis using the t-test:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{S \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}} \dots\dots\dots(1)$$

In the formula above $X_{1,2}$ adalah nilai rata-rata sampel, S is the sample mean value, S is the combined variance and n is the number of students in each class. If the value of $-t_{label} < t_{hitung} < t_{label}$, then H_0 is rejected, meaning H_1 is accepted. If the data condition is not normal and homogeneous then the t' test applies.

III. RESULTS AND DISCUSSION

A. Results

Where research was conducted from January to February 2023 obtained competency data. this study consists of three groups of data, namely data on aspects of attitude, aspects of knowledge, and skills. Attitude competency data was obtained through attitude observation sheets conducted during class hours. Data on the knowledge aspect was obtained by posttest which was carried out at the end of the meeting. A comparison of data on the skills aspect is obtained through work assessment during the learning process. Analysis of attitude competence can be seen in the graph of the average attitude value of the experimental sample and the control sample studied for 5 meetings. Indicators of attitude competence that are assessed are cooperation, discipline, responsibility, and self-confidence:

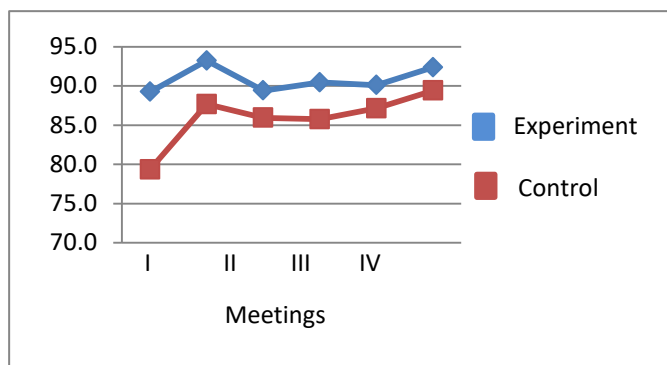


Fig 2. Graph of achievement of attitudinal competence in the sample class

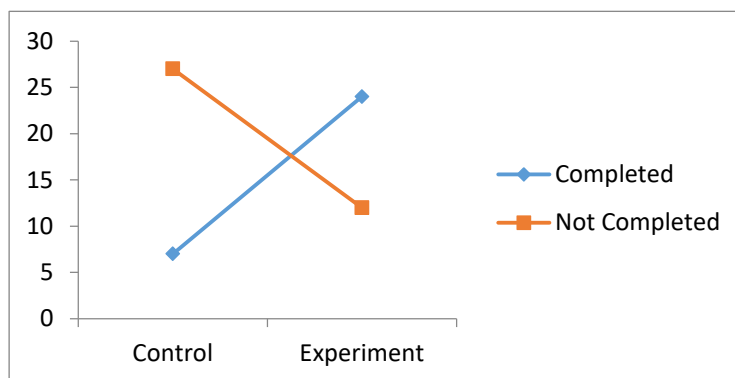
Data analysis of knowledge competence starts from normality, homogeneity, and hypothesis tests. After conducting normal and homogeneous tests, the sample is normally distributed and the sample is a homogeneous variable, then the hypothesis test is carried out.

Table 2. Value on aspects of knowledge competence

| Class | N | The Highest Score | Lowest Value | \bar{X} | S^2 | S |
|------------|----|-------------------|--------------|-----------|-------|------|
| Experiment | 36 | 96 | 60 | 81,1 | 142,2 | 11,9 |
| Control | 34 | 80 | 24 | 64,4 | 283,6 | 14,4 |

Based on the table, it is obtained that the average of the experimental class on knowledge competency is greater than the average value of the control class.

Fig 3. Comparison graph of control classes and experiments on knowledge compatibility



The results of hypothesis testing on knowledge competence can be seen in Table 4:

Table 3. Result of hypothesis

| Class | N | S ² | t _h | t _t | Information |
|------------|----|----------------|----------------|----------------|-------------------------|
| Experiment | 36 | 142,42 | | | |
| | | | 5,24 | 1,99 | H ₀ rejected |
| Control | 34 | 283,66 | | | |

In Table 3, it is known that the value of $t_{hitung} = 5,24$ while $t_{tabel} = 1,99$ with the condition of testing the acceptance of H_0 if $-t_{1-1/2a} < t < t_{1-1/2a}$ the price outside these criteria means that H_0 is rejected with a real level of 5%. with degrees of freedom $dk = (n1 + n2) - 2$. The results of the analysis obtained the value of t is outside the H_0 acceptance area so it can be concluded that H_1 is accepted at the 0.05 level, which means "There is an effect of the use of Scientific worksheets on the knowledge competence of students

Processing of skill competency data after carrying out normal and variance tests found normal sample classes and homogeneous variances, applying t-tests to test temporary conjectures. The indicators assessed in skill competency are observation, assembling tools, the process of obtaining data, and drawing conclusions.

Skills competency can be seen in Table 5:

Table 4. Result of hypothesis

| Class | N | S ² | t _h | t _t | Information |
|------------|----|----------------|----------------|----------------|-------------------------|
| Experiment | 36 | 12,15 | | | |
| | | | 7,32 | 1,99 | H ₀ rejected |
| Control | 34 | 49,09 | | | |

Table 4 states that the value of $t_{count} = 7.32$ while $t_{table} = 1.99$ with the terms of acceptance of H_0 if $-t_{1-1/2a} < t < t_{1-1/2a}$ the price outside these criteria means that H_0 is rejected with a real level of 5% and $dk = (n1 + n2) - 2$. The results obtained the value of t is outside the H_0 acceptance area so it can be concluded that H_1 is accepted at the 0.05 level, which means "There is an effect of using the Scientific worksheets on the competence of the participant skills of students".

B. Discussion

The research target is to see the effect of using the guided inquiry model assisted by Scientific worksheets on the physics competence of students . The research was conducted using two samples (experimental and control), the experimental class applied the guided inquiry model assisted by the Scientific worksheets, and the control class utilized the guided inquiry form assisted by existing media at school. The results of the study showed an increase in student competence after using the guided inquiry model assisted by the Scientific worksheets.

The use of a combination of student-focused learning approaches and media is proven to improve student competence, competence in science certainly affects the knowledge obtained by students, in attitude competence affects the pattern of taking attitudes in an event scientifically and reliably, while skills can improve the ability in the process of taking action[9]. Learning that is accompanied by a scientific approach further enhances the ability of students independently so that they can solve problems independently and with a scientific attitude[19]. These functions in everyday life must be applied in the learning process. The reason why students become independent is being able to classify problems, analyze conjectures and examine the truth of these conjectures both independently and in groups accompanied by enhanced scientific abilities [20]. the use of student worksheets media is a suggested activity in the student-focused learning process. The purpose of this suggestion is to facilitate educators in supervising, guiding, and students as an activity guide. so that it is expected to increase focus and scientific spirit in students.

To improve scientific learning, students need to be involved in the process of investigation and conduct practicum to understand the concept of the learning material provided. The increase in student competence in the use of investigative learning models assisted by scientific worksheets in the aspect of attitude can be seen in the average results of the experimental sample attitude of 90.48 higher than the control sample of 84.00. In knowledge competency, after analyzing the value of the experimental sample is better than the control sample 81.11 and 64.47. Based on the data obtained in the experimental sample, students who passed the KKM were 66% of 36 students or as many as 24 people while in the control sample students who passed the KKM were only 7 people or 20.5% of 34 students. This shows the success of the experimental class is better than other samples. Learner competence in the realm of skills shows the process of students in the process of practicum or experimentation. Based on the data obtained and analyzed, it shows that the average skill of the experimental sample (87.32) is more successful than the control sample (77.72). This shows that there is an effect of using the Scientific worksheets on the physics skills of students.

Based on the description above, there is a fact that the use of student worksheets can regulate student actions in the learning process, by obtaining knowledge in the form of facts that can be accounted for both socially and scientifically, the use of student worksheets also affects students' attitudes both spiritual tolerance attitude towards circumstances, high self-confidence as evidenced by the ability to convey opinions, cooperation, and responsibility in the problem-solving process ability to work in k, the learning process that uses scientific worksheets is not only fixated on results but on the process of obtaining these results so that this is the reason for increasing student competence both in knowledge and attitudes and skills

IV. CONCLUSION

Based on the results of the research carried out, student worksheets have a significant influence on student competence, Which case can affect students' knowledge, attitudes, and skills in the learning process, this is reinforced by the results of data analysis obtained showing that the experimental class scores are higher than the control class scores in all three aspects. There is a high effect of using the guided inquiry model assisted by the Scientific worksheets on the competence of class X students of SMA Pertiwi 1 Padang. As for suggestions in this study, the teacher's ability to control the situation greatly affects the results of student competence. There is a high effect of using the guided inquiry model assisted by the Scientific worksheets on the competence of class X students of SMA Pertiwi 1 Padang.

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