**JoTaLP: Journal of Teaching and Learning Physics 5, 1 (2020): 41-47**
**Website:** http://journal.uinsgd.ac.id/index.php/jtlp/index
**ISSN** 2580-3107 **(online) ISSN** 2528-5505 **(print)**

# IMPLEMENTATION OF GUIDED INQUIRY LEARNING PHYSICS MODEL ON THE CONCEPT OF STATIC FLUID

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## ABSTRAK

Pembelajaran konsep fisika khususnya fluida statis sangat susah dipahami oleh sebagian peserta didik khususnya dalam proses pembelajaran praktikum di sekolah. Hal ini dapat dilihat pada saat peserta didik yang melakukan praktikum sering melakukan kesalahan praktik yang berkaitan dengan kehidupan sehari-hari. Oleh karena itu model pembelajaran inkuiri terbimbing sangat penting untuk konsep ini. Penelitian ini bertujuan untuk mengetahui peningkatan hasil belajar fisika siswa kelas X IPA SMA Negeri 13 Takalar setelah diajar dengan model pembelajaran inkuiri terbimbing. Penelitian ini adalah pra-eksperimental dengan desain satu kelompok pretest-posttest. Populasi dalam penelitian ini adalah seluruh siswa kelas XI IPA SMA negeri 13 takalar yang berjumlah 63 siswa. Adapun teknik pengumpulan data, yaitu tes hasil belajar dalam bentuk pilihan ganda yang terdiri dari 26 pertanyaan yang valid. Hasil analisis deskriptif menunjukkan bahwa skor rata-rata pretest siswa adalah 9,5 dan standar deviasi 2,88 sedangkan skor rata-rata posttest 18,98 dan standar deviasi 2,98. Skor N-Gain 0,57 dan terkulai di level sedang. , dengan demikian dapat dikatakan bahwa model pembelajaran inkuiri terbimbing dapat digunakan untuk meningkatkan hasil belajar fisika siswa kelas XI IPA SMA Negeri 13 Takalar pada konsep fluida statis.

Kata kunci: inkuiri terbimbing, Hasil Belajar Fisika, fluida statis

## *ABSTRACT*

*Learning physics concepts, especially static fluid, is very difficult for some students to understand, especially in practicum learning processes in schools. This can be seen when students who do practicum often make practice mistakes related to daily life. Therefore the guided inquiry learning model is very important for this concept. This research aims to find out the improvement of physics learning outcomes of students of class X IPA SMA Negeri 13 Takalar after being taught with the the guided inquiry learning model. This research is a pre-experimental with one group pretest-posttest design. The population in this research were all student of class XI IPA SMA Negeri 13 Takalar totaling 63 students. As for data collection techniques, namely the test of learning outcomes in the form of multiple-choice consisting of 26 valid questions. The descriptive analysis result shows that the average score of student pretest is 9.5 and the standard deviation of 2.88 while the posttest average score of 18.98 and a standard deviation of 2.98. The N-Gain score of 0.57 and located at a moderate level. , thus it can be argued that the the guided inquiry learning model can be used to improve the physics learning outcomes of students of grade XI IPA SMA Negeri 13 Takalar on the concept of static fluid.*

Keywords: guided inquiry, Physics Learning Outcome, static fluid

DOI: http://dx.doi.org/10.15575/jotalp.v5i1.7725
Received: 12 Februari 2020 ; Accepted: 5 April 2020 ; Published: 8 April 2020

## 1. INTRODUCTION

Entering the development of the millennial era, learning at this time demands a major change in the national education system. A good education system must be able to provide a quality education because education aims to transfer knowledge, values and abilities so that it is expected to be able to find and create new works after taking an education level (Maruf, M, 2013).

To achieve good quality education and modern certainly requires standards, continuous innovation, technology, financial and human resources professionals. As already stated that professional teachers must have four competencies, namely pedagogical, personal, social, and professional competencies. Teacher professionalism is not the ability to develop knowledge but rather the ability to carry out learning that is interesting and meaningful for students (Sahriani, I., Arsyad, M., & Maruf, M, 2016).

When the teacher has mastered the four competencies, the learning process held will be interactive, inspirational, and motivate students to actively participate in teaching and learning activities (Maruf, M., & Rahim, A. L, 2013).

But one of the problems faced at this time is that the learning process that takes place is not yet optimal, one of them is in learning physics. Physics is abstract because apart from being difficult there are some physics materials that cannot be seen with the five senses. Therefore, physics material needs to be presented well so that students are able to understand the concepts taught by the teacher (Syam, M., Arsyad, M., & Maruf, M, 2015).

One of the physical materials that are still considered difficult is static fluid. A number of students have difficulty in understanding physical concepts in static fluid material so students tend to experience errors in solving the given problem (Ariansyah, A., Khaeruddin, K., & Maruf, M, 2015).

Besides, physics learning is mostly done by giving physics concepts without going through the processing of the potential that exists in students and those around it so that learning physics is less meaningful which causes physics learning outcomes to be low (Maruf, M., & Hustim, R, 2018).

Based on statistics from the Takalar 13 Public High School, information was obtained that physics learning outcomes were still low. Some of the factors causing the low learning outcomes are the lack of student interest in physics because students assume that physics is a difficult and boring subject because learning cannot be separated from counting and memorizing formulas, in addition, they sometimes only imagine about the material being taught (Multasyam, M., Yani, A., & Maruf, M, 2016).

One way to overcome the problems that have been presented previously, then in the learning process we need a model that is able to optimize the learning process by maximizing the involvement of students in the learning process. The learning model in question is the application of guided inquiry learning models. Guided inquiry or guided inquiry requires students to work and be actively involved to the maximum to investigate systematically, critically, and logically so that they can formulate their own findings with confidence (Jumiatun, J., Samad, A., & Maruf, M, 2016).

In learning physics very much needed a learning model oriented to the inquiry process but not only that, the learning media also greatly affect the learning process especially those that use ICT in learning physics (Ma'ruf, M., Marisda, D. H., & Handayani, Y, 2019). Besides, in the development of technology now. hybrid learning is also able to facilitate the learning process that uses the guided inquiry model (Ma'ruf, M., Handayani, Y., Marisda, D. H., & Riskawati, R, 2020).

The use of android is also very helpful for some practical physics tools that are more practical and

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facilitate the learning process of physics, especially when the inquiry process takes place. Almost all tools that use sensors are available in the Android application (Ma'ruf, M., Setiawan, A., & Suhandi, A, 2019).

Correspondingly, research conducted by Tarigan et al states that the learning outcomes of students in the experimental class by applying the guided inquiry learning model has increased from an average pretest value of 31.05 to an average posttest value of 70.54 in the category has reached the KKM value (Yani, A., & Maruf, M, 2015).

## 2. METHODS

This type of research is pre-experimental research carried out at Takalar 13 Public High School with the research design used is the design of One Group Pretest and Posttest with the following patterns:

$$\mathbf{O_1} \qquad \mathbf{X} \qquad \mathbf{O_2}$$

Data collection techniques used in this study are the provision of tests (pretest and posttest) in the form of multiple-choice tests that have been validated. This test is carried out twice, that is before being treated and after being given treatment in the form of the application of the guided inquiry learning model.

Student physics learning outcomes data were analyzed using descriptive statistical analysis which aims to determine the magnitude of learning outcomes (Ma'ruf, S. P, 2018). The intended physics learning outcomes are learning outcomes before and after the guided inquiry learning model is applied.

Furthermore, the data obtained were analyzed using inferential statistics, one of which is the N-gain calculation to find out the amount of recall of physics learning outcomes calculated based on the following formula:

$$g = \frac{posttest\ score - pretest\ score}{maximum\ possible\ score - pretest\ score}$$

With the gain index interpretation criteria, namely:

**Table 1.** Criteria for interpretation of the gain index

| Gain Index | Criteria |
|---|---|
| $g > 0{,}7$ | Height |
| $0{,}70 \geq g \geq 0{,}30$ | Medium |
| $g<0{,}30$ | Low |

## 3. RESULT AND DISCUSSION

### 1. Descriptive Analysis Results

**Table 2.** Results of Pretest Data Analysis

| Statistics | Score | |
|---|---|---|
| | ***pretest*** | ***Posttest*** |
| Maximum score | 15 | 25 |
| Minimum Score | 5 | 14 |
| Average ($mean\ \bar{X}$) | 9,5 | 18,98 |
| Median ($Me$) | 10,93 | 18,88 |
| Mode ($Mo$) | 9,5 | 18,7 |
| Standard deviation ($s$) | 2,88 | 2,98 |
| Ideal score | 26 | 26 |

Based on the results of these data it is obtained that the implementation of the guided inquiry learning model on the concept of static fluids has increased considerably from the results of the pretest and posttest. this illustrates that the guided inquiry process carried out very effectively in learning especially static fluid.

The maximum score obtained is 15, while the minimum score obtained is 5, the average score of physics learning outcomes before applying the guided inquiry learning model is 9.5 from the ideal score of 26.

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The median value is 10, 93. The most common value appears or mode (Mo) of 9.5 while the standard deviation is 2.88. Whereas in the posttest the maximum score obtained was 25, while the minimum score obtained was 14.

The average score of physics learning outcomes after the guided inquiry learning model was applied was 18.98 from the ideal score of 26. The median score was 18.88. The most common value appears or mode (Mo) of 18.7 while the standard deviation is 2.98.

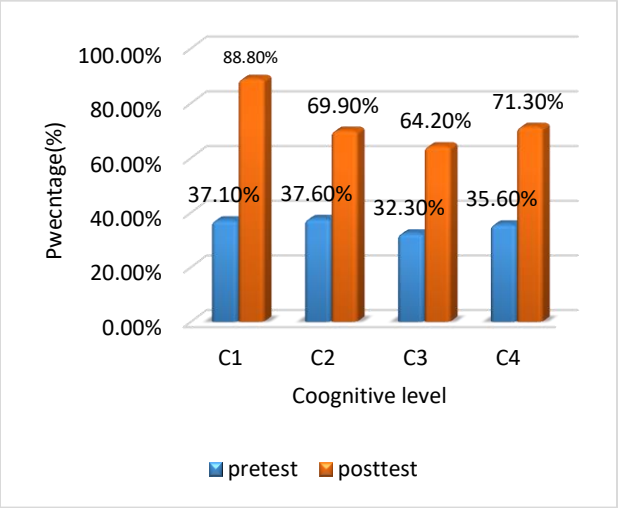


**Figure 1**. the learning outcomes of students as a whole at the cognitive level.

Based on figure 1 shows the learning outcomes of students as a whole at the cognitive level. At the time of the pretest, the largest percentage of students were at the level or indicator C2 (comprehending) namely 37.60% and the smallest percentage of students were at the level or indicator C3 (applying) which is 32.30%.

While for the posttest, the highest percentage of learners is also in the CI level (knowing) which is 88.8 %% and the smallest percentage is in the level or C3 indicator (Applying) which is 64.2%. So it appears that students who answer correctly at every level have increased percentages.

## 2. Inferential Analysis

The normality test is done using chi-squared. If the value of χ2 counts <value χ2 tables then the data is normally distributed while if χ2 counts> values χ2 tables then the data is not normally distributed. An overview of the results of the normality test can be seen in the following table.

**Table 3.** Variable Normality Test Results Student Physics Learning Outcomes

| Data | χ2 count | χ2 table | information |
|---|---|---|---|
| *Pretest* | 10,625 | 11,070 | Normal |
| *Posttest* | 9,221 | 11,070 | Normal |

Based on Table 3 above, it can be seen that the significant value is taken based on the chi-square table with a significance level of 0.05 and DK = 6 - 1 = 5. From the results of the above calculation we obtain X2count = 10.625 for α = 0.05 and DK = 5 , then X2 table = 11,070 is obtained. Thus it can be concluded that the calculated X2 <X2 table is 10.625 <11.070 which means the physics learning outcomes of students for the pretest come from populations that are normally distributed. While for the posttest data obtained X2 count = 9.222 for α = 0.05 and DK = k-1, then obtained X2 table = 11.070. Thus it can be concluded that the calculated X2 <X2 table is 9,221 <11,070 which means that the physics learning outcomes of students for the posttest come from normally distributed data.

The t-test in this study used a correlated (paired) sample t-test called a related t-test. By using the t-test analysis of students' physics learning outcomes, it can be seen from the following table:

**Table 4.** Hypothesis Test Results Score Results in Learning Physics of Students.

| Data | $t_{count}$ | $t_{table}$ | Criteria |
|---|---|---|---|
| *Pretest* | 21,36097 | 1,70329 | $H_a$ accepted |
| *Posttest* | | | |

Based on table 4 above, the value of tcount = 21.36097 is obtained, while the ttable value for

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the significant level α = 5% and DK = n - 2 = 29 - 2 = 27 is 1.70329. Thus $t_{count} > t_{table}$, then Ha is accepted and Ho is rejected so that it can be concluded that the physics learning outcomes of students after being taught with guided inquiry learning model. Thus it is known that there is an increase in physics learning outcomes for Class XI IPA 1 students at SMA Negeri 13 Takalar after being taught by applying the guided inquiry learning model.

Improved physics learning outcomes for each student on the application of guided inquiry learning models using the N-Gain equation. The results of the analysis can be seen in Table 4 below.

**Table 5.** Distribution and Percentage Normalized gain

| gain Indeks | criteria | (%) | Normalized average gain |
|---|---|---|---|
| g > 0,7 | Height | 17,24 | 0,57 |
| 0,70 ≥ g ≥ 0,30 | medium | 75,86 | |
| 0,30 < g | low | 6,90 | |
| Amount | | 100 | |

Table 5 shows that 17.2% of students fulfilled the high criteria, 75.86% of the students fulfilled the medium criteria, and 6.90% of the other students who met the low criteria. It was also seen that students of class XI IPA 1 at SMA Negeri 13 Takalar had an average normalized gain score of 0.57 in the medium category.

## 3. Discussion

This type of research is a pre-experiment. In the design, there is a pretest before being given treatment and posttest. Thus the results of the treatment can be known more accurately because it can compare with the conditions before treatment. Before giving a posttest, first, give treatment to students of class XI IPA 1 which is used as a research sample in the form of a discussion of the material with a guided inquiry learning model.

Based on the results of data analysis on the pretest obtained an average score of physics learning outcomes of students by 9.5 and a standard deviation of 2.88 while learning outcomes after applying the guided inquiry learning model obtained an average score of students of 18.98 and a standard deviation 2.96. This shows that there is an increase in students' physics learning outcomes after being taught using the guided inquiry learning model. This is supported by research conducted by Hosnah, et al, who stated in their research conclusions that the video-assisted guided inquiry learning model has a significant effect on students' cognitive learning physics outcomes (Nuraisyah, N., Samad, A., & Maruf, M, 2016).

Furthermore, the results of the inferential analysis for the t test that has been done is known that the results obtained indicate that tcount> ttable then Ha is accepted and Ho is rejected. So from the t test that has been done, it can be seen that the physics learning outcomes of Class XI IPA students at SMA Negeri 13 Takalar increase after being taught by applying guided inquiry learning models while in the N-Gain test a large increase in physics learning outcomes of students in the medium category individually from 29 students there are 5 students or (17.24%) who get the high category, 22 students or (75.86%) who get the medium category and 2 students or (6.90%) who get the low category. The average score of the analysis of the N-Gain test is 0.57, the increased category is in the medium category.

In the research that has been done, it can be concluded that the guided inquiry learning model shows better results, so it can be said to be good to be applied in the learning process. Because of the guided inquiry learning model, teachers can create learning conditions that guide and guide students so that learning objectives can be achieved properly, the learning process becomes meaningful, not just transferring knowledge. It is

also due to the guided inquiry learning model that is designed with several stages namely problem identification, making hypotheses, designing experiments, conducting experiments, interpreting data, and communicating experimental results (Maruf, M., Arsyad, M., & Satriani, A, 2016).

## 4. CONCLUSIONS

Based on the results of the data obtained in this study, it can be concluded that there is an increase in physics learning outcomes of students in class XI IPA 1 of Takalar 13 High School before and after being taught by applying guided inquiry learning models with N-Gain calculations of 0.57 and located in the medium category

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