# The Result of Student's Process Skills Through the Implementation of Gas Kinetic Theory Learning Media Based on Inquiry Approach

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**Abstract:**This study aims to determine the learning outcomes of students' process skills through the implementation of gas kinetic theory learning media based on the inquiry approach. The method that what used in this research is One Shot Case Study design. The subject of this research is class XI MIA 3 SMANegeri4Pekanbaru. An Instrument of the data collection wastest ofthe learning result of learning processskills. The data analysis technique used was descriptive analysis.The results showed the average absorption capacity of students' process skills was in a good category at 74,95%. The level of process skills shows 81,25% of students have good basic skills, while the integrated skills are68,75%.It can be concluded that the implementation of learning media in the form of experimental devices based on the inquiry approach can improve the learning outcomes of student's process skills in the material of the kinetic theory of gas.

Keywords: The Result of Student's Process Skill,Inquiry Approach, Learning Media

## 1. Introduction

Physics is one of the subjects in school that is important to be taught as a separate subject due to several considerations. First, in addition to providing knowledge to students, physics is able to foster the ability to think, cooperate, be scientific and communicate inquiry, which functions to solve problems in everyday life. Secondly, physics needs to be taught for more specific purposes, namely to equip students with the knowledge, understanding, and abilities required to enter a higher level of education in developing science and technology (Gayuh, 2015). One assessment that can be done by the teacher in the implementation of the teaching and learning process is the assessment of process skills. The advantages of process skills make students become creative, active, skilled in thinking and skilled in acquiring knowledge, so students can hone their thinking patterns to improve the quality of learning outcomes (SyaifulSagala, 2011).

One of the physics lessons in class XI SMA is the kinetic theory of gas which is material that requires abstract thinking. In the subject matter of this gas kinetic theory students are not only required to obtain a collection of knowledge in the form of facts, concepts or principles but also the process of concept discovery. The purpose of process skills in science learning is to develop students' creativity in learning so that students can actively develop and apply their abilities. Warda,et al (2014).Adrian Rustaman (2010) suggests that the types of skills include: observing, classifying, interpreting, predicting, communicating, asking questions, submitting hypotheses, planning experiments, conducting experiments.

The experimental device used serves as a means for students to more easily understand the concepts in the material of the kinetic theory of the gas. The presence of media has significant significance in the process of teaching and learning activities. This is caused by the complexity of the material to be conveyed and the abstractness of the material can be concreted with the presence of the mediaso that it can be said that the media is any tool that can be used as a channel for messages to achieve teaching objectives. The teaching and learning process is basically also a process of communication so that the media used in learning are called learning media (IwanFalahudin, 2014).One alternative learning approach that is expected to enable students and overcome the above problems is the inquiry approach.Juhji (2016) states that inquiry is a series of learning activities that emphasize critical and analytical thinking processes to find and find answers to a question in question so that it can developmental processes including curiosity, critical thinking, investigation, and solving a problem. The inquiry approach can be trusted to realize active learning so that it can increase student independence. Chusni (2016) suggested that the inquiry approach can increase motivation and understanding of the concept of physics as shown by the results obtained by 63,57%. The increase in learning outcomes of process skills with the inquiry approach was also raised by Khairani and Fransisca (2015) with a success percentage of 67,65%. Learning outcomes of students' process skills by applying conventional learning by 84,21%, but the presentation of learning outcomes increased to 94,74% after being given treatment by applying the inquiry approach (Insar,2018). Nurhasanah (2016) also stated that the absorption capacity of students' process skills in heat material with the inquiry approach was 77,19%.

This study aims to determine the learning outcomes of students' process skills through the application of gas kinetic theory learning media based on the inquiry approach. The inquiry approach is needed in the teaching of this kinetic theory of gas so students can think scientifically. Students can understand this material by conducting experimental activities using learning media that can facilitate students in the process of discovering the concept of gas kinetic theory scientifically based on students' creativity and reasoning.

## 2. Methodology

This research was carried out at SMA Negeri 4 Pekanbaru in November 2017-January 2018 with the research subjects of class XI MIA 3 Pekanbaru 4 State Senior High School consisting of 12 male students and 24 female students. The research design used was Pre Experimental Design, which gives the treatment of the inquiry approach to the material of the gas kinetic theory, then measures the learning outcomes of students' process skills. The research design is in the form of One Shot Case Study (Sugiyono, 2012).

The data used in the form of primary data obtained from the assessment score of learning outcomes of student process skills after the inquiry approach was applied. Data collection techniques are carried out by testing to obtain learning outcomes of student process skills. This test of learning outcomes is carried out after the learning process is implemented. Data analysis used is descriptive analysis aims to see the learning outcomes of student process skills by using the absorption and effectiveness of learning categories based on the inquiry approach. The interpretation of the data is done by describing the percentage of the number of students who passed on each indicator of the ability to process. The percentage of students is then grouped based on the level of basic and integrated process skills.

## 3. Result and Discussion

The data analyzed in this study is the data on learning outcomes of students' process skills obtained from the post-test scores. The results of the descriptive analysis of the scores of students' learning process skills can be seen in Table 1. below:

Table 1. Analysis of Student Learning Outcomes of Process Skills in the Gas Kinetic Theory Material

| No | Interval | Kategori | JumlahSiswa | JumlahSiswa (%) |
|---|---|---|---|---|
| **1** | 85 – 100 | AmatBaik | 14 | 38,89 |
| **2** | 70 – 84 | Baik | 13 | 36,11 |
| **3** | 50 – 69 | CukupBaik | 5 | 13,89 |
| **4** | 0 – 49 | KurangBaik | 4 | 11,11 |
| **DayaSerap Rata-Rata (%)** | | Baik | 36 | 74,95 |
| **EfektivitasPembelajaran** | | **Efektif** | | |

Table 1.shows that the four categories of student absorptions are spread across all categories. The most dominant student absorptive capacity is in the very good category, as many as 14 students from 36 students with a percentage of 38,89%. Analysis of students' absorptive capacity on the material of gas kinetic theory shows that the absorption capacity of class XI MIA 3 students of SMAN 4 Pekanbaru is in the good category with an average absorption rate of 74,95%, so the effectiveness of learning through the implementation of learning media approach of kinetic gas based approach inquiry is in the effective category.

Physical learning through the implementation of instructional media based on inquiry approaches makes learning more active, independent and varied. During the learning process by applying the inquiry approach, students are directed to learn in groups in working on LKPD.Inquiry learning conducted in this study students have more roles in the learning process in the classroom. Students are divided into 5 working groups with each group consisting of 7 to 8 people. Each group is given one LKPD and one experimental tool in accordance with the sub-material kinetic theory of gas to be studied.

Students conduct experiments referring to the LKPD that has been given. The role of the teacher is to supervise and give direction to students who experience difficulties in carrying out the experiment. The activity makes each group must play an active role in the process of conducting experiments, observing data, processing data, answering questions, asking teachers and discussing with each group.
Based on the level of student process skills, the percentage data on the number of students who graduate can be grouped according to Figure 1 below:

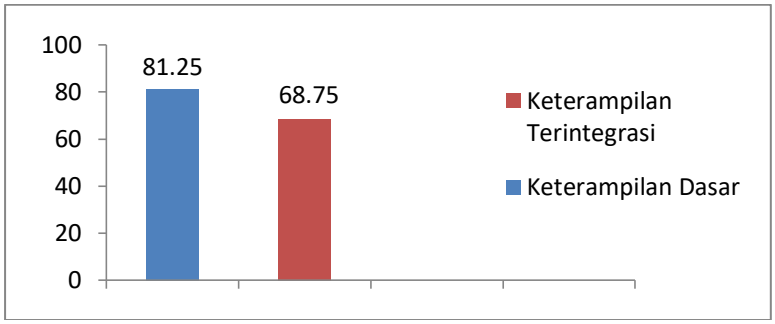


Figure 1. Percentage of Number of Students Graduation in Each Level of Process Skills

Based on Figure 1.can be described the ability of students in solving problems for each level of process skills as follows:

### 3.1. Basic Skills

a. Planning an Experiment

In this indicator, students must be able to know what tools and materials needed to conduct an experiment according to the explanation stated in the Student Activity Sheet (LKPD). The results of the analysis presented in Figure 1. show that 97,22% of the total number of students passed in planning the experiment. One of the physics lessons in class XI SMA is the kinetic theory of gas which is a very difficult material. During this time the learning is doneby the teacher on the kinetic theory of gas still uses lectures interspersed with discussion. In this learning, the teacher can actually invite students to observe events to lead to understanding the materialso that learning can take place better if applying a learning media in the form of experimental devices. The experimental device used serves as a means for students to more easily understand the concepts in the material of the kinetic theory of this gas. Students are given the opportunity to find concepts independently by maximizing experimental planning skills (Novita and Aqmaliya, 2016). Roestiyah (2008) also states that in this process skill indicator students have succeeded in carrying out one of the points of the inquiry approach that students have the freedom to learn independently indicated by the percentage of the number of students who passed the indicator planning this experiment in the very good category.

b. Classify

The results of the analysis in Figure 1.states that the percentage of students who passed on the classifying indicator shown in problem number 3 was 69,44%. There were 4 students who vacated the answers and 7 students who answered incorrectly. This is due to the lack of students in understanding the problem so that there are some students who answer incorrectly just pairing or grouping data by giving arrows, but the answers filled by the students are also imperfect. Problem-solving by students is not in accordance with what was ordered in the problem. The ability to classify requires the ability to sort an object by observing the similarities, differences, and relationships of the object (Dimyati, 2013). In classifying, the system used should be chosen that best suits the purpose. As stated by Mohammad Nur (2011) that in science, objects and processes can be classified in different ways. This is so that the grouping is easy to understand.

c. Observe

Observing skills is the ability to collect information obtained from objects and natural phenomena by using or more senses. Dimyati (2013) states that information obtained from observing skills can demand curiosity, question, think, interpret the environment and search further. This ability to observe is the most basic skill in the process of acquiring knowledge in developing other process skills.

Based on the results of the analysis of the tests that have been carried out the percentage of the number of students who graduated from observing skills was 77,77%. There are still students who are unable to solve this problem due to the lack of seriousness of students in conducting experiments so that they are still experiencing confusion when working on the questions. In accordance with what was stated by WinaSanjaya (2006) that readiness and seriousness in the learning process is very necessary because it is one of the laws of learning. The essence of this learning law is that each individual will respond quickly from every stimulus when he or she does not yet have readiness. The same thing expressed by Balim A.G (2009) in international journals that the activities of investigations with discoveries can be used with the aim of describing the attention of students and their active participation in the class.

d. Conclude

In this indicator, students are expected to be able to make final conclusions regarding the temperature, pressure, and volume of the data given in table form. The results of the analysis in Figure 1.show that the percentage of students who passed on this indicator was in the second largest sequence, which was 80,56% of the total number of students. But there are still students who do not understand in reading the data in the table and understand the laws relating to the data presented in the table. Lack of understanding in determining the relationship of temperature, pressure, and volume presented in the form of a formula. In general, the difficulty in solving physical problems can be indicated by the students' ability to understand concepts and the ability to think about solving problems or problems. Misunderstanding the concept arises due to students' mistakes in constructing their knowledge (Ani, 2006). Less optimal concluding skills are also caused by students not accustomed to interpreting from the results of observations in the form of data presented in the form of tables and then compile them into conclusions (Chusni and Widodo, 2013).

### 3.2. Integrated Skills

a. Communicate

This indicator aims to determine the ability of students to communicate problems in the form of pictures (graphs or charts), discussions and presentations. In problem number 2 given by showing this indicator is achieved if students are able to describe empirical data from the results of experiments on Boyle's Law from observation to graphical form. The data are shown in Figure 1. is 77,77% of the total number of students declared to pass on the indicator of communication skills. Students who were declared not graduated were due to students who did not write answers at all and the students who answered were not right. This happens because of the students' inability to represent. MeliSiska (2013) states that not achieving indicators of communication skills can be caused by unfettered students in presenting data obtained from experimental results into the graphic form or changing the form of presentation of data because students are more often given worksheets equipped with observation tables. Teachers also rarely train students to be skilled in communicating through images (graphs or charts). The results of this analysis are in accordance with the results of research conducted by EkaLiandari, et al

(2017) that students' communication skills through images (graphs or charts) only reach 40% due to lack of trained students in communicating experimental data by changing the form of data presentation.

b. Predict Data

Predictive skills can be interpreted as making predictions or estimates about things or events that will occur in the future, based on the relationship between facts, concepts, and principles in science. This indicator will be achieved if students are able to understand the relationship between pressure (P), temperature (T), and volume (V). The data are shown in Figure 1. that the percentage of students who passed on this indicator included the lowest achievement of the 8 indicators presented in the form of questions which amounted to 61,11%. The error that still occurs is due to the lack of students' ability to understand the relationship of pressure, temperature, and volume of the data that has been givenso that students cannot solve the given problem properly. One way to foster predictive ability is by finding or finding patterns and relationships based on available evidence (Nur, 2011).

c. Formulate a Problem

In the aspect of formulating this problem, students make a question of the case study given to the problem. The results of the analysis in Figure 1. 75% of the total number of students passed on this indicator. Students who have not reached the graduation limit on the problem formulation skills indicator are caused by a lack of understanding of the case studies provided so that the results are not as expected. The lack of seriousness in understanding the LKPD that had been done at the previous meeting also affected the learning outcomes of process skills measured from the score of the test results given. In addition, students are less able to identify problems given in the form of images so that students find it difficult to find a problem formulation in accordance with the illustrations given in the problem (Wiriatmadja, 2007).

d. Preparing Hypothesis

The ability to form hypotheses is one of the very basic skills in scientific work. The hypothesis is an estimate that aims to explain a particular event or observation. Figure 1.shows that the percentage of students who passed this indicator was 61,11%. Students who have not reached the graduation limit on the indicators form hypotheses due to lack of understanding in the formulation of the problem that is made so that it is difficult to find a hypothesis. The lack of students' ability in developing hypotheses shows that students have not been able to carry out the learning process with a maximum inquiry approach (Roestiyah, 2008).

It can be grouped that the percentage of students graduating in this basic skill is 81,25% of the total number of students. Most students have been able to solve process skills problems at the basic level well. Basic skills are simple process skills that students have without requiring high-level thinking. Given the process that has been carried out when learning is also influential in solving problems at the skill level of this process. This is in accordance with what was stated by Nuryani (2005) that learning through inquiry influences students to remember longer because students find the concept itself. Ahmad and Bagja (2007) added that the use of instructional media also plays an important role in building students' knowledge because by using the media a concept becomes clearer to students so that it is easier to remember.

In integrated skills, the percentage of students graduating is 68,75%. The data shows that the percentage of students graduating in integrated skills is lower than basic skills. In general, the same individual errors are found in the indicators formulating problems and formulating hypotheses. In this integrated skill in accordance with the application of inquiry, training must

often be carried out so that the process skills possessed by students are more honed so that the results of learning process skills at this level are better.

## 4. Conclusion

Learning outcomes of student process skills based on the inquiry approach are good enough, indicated by the absorption of student process skills by 74,95%. Based on the classification of each indicator, the percentage of graduates in basic skills was 81,25% better than integrated skills at 68,75%. This shows that the learning outcomes of students' process skills and the effectiveness of the learning carried out are in a good category.

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