Application of Snowball Throwing Model to Improve Students' Understanding of Concepts and Communication Skills in Gas Kinetic Theory

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Abstract

This research is based on the number of students who find it difficult to learn physics because of the lack of understanding of concepts and only memorization and still lack of communication skills of students. Based on this background, a study was conducted that aims to improve the understanding of students' concepts and communication skills by applying snowball throwing learning model on gas kinetic theory material. The method used in this study is experimental method, the population in this study is all students of XI IPA SMA IT Nurul Jannah and then selected with simple random sampling technique so that there are 23 students of grade XI IPA SMA IT Nurul Jannah. The result of the study is the application of snowball throwing model can improve the understanding of the concept with a pretest average of 25,6 and then increase by a posttest average of 57,4, with a large N-gain of 0,4 so that the medium category and t-test results of 7,65 are greater than the table t with a confidence level of 5%. The snowball throwing learning model can also improve students' communication skills, with an initial average of 45,41 and after the application of the model to 67,15, with a large N-gain of 0,4 so that the medium category, as well as the t-test results are 8,48 greater than the large, t-table that is 2,07. So, it can be concluded that the Learning Model of Snowball Throwing can improve the concept and communication skills understanding of student. For further research, it is recommended to utilize learning media to improve concept understanding by collaborating using snowball throwing learning models.

Keywords: Communication Skills; Concept Understanding; Snowball Throwing

INTRODUCTION

Based on Permendikbud No. 20 of 2016 concerning Competency Standards of Primary and Secondary Education Graduates, that every graduate student from a unit of primary and secondary education must have competencies on three dimensions, namely attitude, knowledge, and skills (Kemendikbud RI, 2016). 21st century skills that are very important to master, one of which is Communication, by having good communication skills will make it easier for students to communicate a lot about learning materials. In this communication skill, students are required to know, control, and create verbal and written communication (Nurjanah, 2019). Communication skills are certainly

needed in every subject, including science.

Science is one of the sciences that master the science, the facts, the concepts of nature. One of the design of science is physics which consists of concept components (Lestari, Rahayu, & Hikmawati, 2017). The goal in this physics subject is to understand the concepts of Physics because they are the beginning of various cognitive structures (Khasanah, 2010), in physics learning is required an understanding of fundamental concepts not just memorizing facts and formulas (Saregar, Marlina, & Kholid, 2017). Understanding concepts become one of the indicators that determine whether physics learning is successful or not. Understanding concepts is a person's ability to understand a fact that is around and be able to compare with the concept scientifically (Yaumi & Zulaikah, 2019). Understanding the concept is needed in solving a problem, whether it is a question of evaluation or a problem in life, in accordance with the nature of science that requires a scientific method to solve a problem (Saregar & Sunarno, 2013).

Students have a poor perception of Physics subjects as subjects that are very difficult to learn and feared by many students (Kurniawati & Nita, 2018), one of the causes is a lack of understanding of concepts. In addition, in general, students will only memorize the definition of the concept without paying attention to the relationship between concepts with each other. The concept has no meaning and cannot be used because the concept stands alone, making it difficult for students to understand and digest it (Lestari et al., 2017). The cause of the lack of understanding of the concept consists of two factors, the first is an error in interpreting a symptom in life or commonly referred to as misconceptions, and the second is the teacher who conducts the learning process does not direct students so that students make mistakes in interpreting a concept (Mentari, Suardana, & Wayan, 2014).

One of the physics materials that suffered a lot of misconceptions is in the material of Gas Kinetic Theory. Based on previous research, that students experience errors in interpreting a concept or misconception on each item of the given question, as well as the greatest percentage of the sub material of ideal gas laws, students are still unable to understand the application of these ideal gas laws in life (Harizah, Setyarsih, & Mukhayyarotin, 2016).

In communication skills are still finding problems that there are still many students who have less communication skills, that out of the 50 sample students tested, there are only 3 students or 6% of students already have very good communication skills, then 16 students or 32% of 50 students have moderate communication skills, and the latter for 31 students or 62% of students have sufficient communication skills. A fairly high comparison for students who already have high communication skills with a fairly / low (Astuti, Sugiyo, & Suwarjo, 2013).

For helps students to improve their understanding of a concept, which must be done by the teacher is to give a direction and explain the concept that is not easy for students to learn and avoid learning that only focuses on the teacher (Salam, Setiawan, & Hamidah, 2010). Similarly, to improve students' communication skills, it reduces teacher-centered learning, for example by group learning that will give students the opportunity to share their knowledge and experiences (Suliswa, Rosmaiyadi, & Buyung, 2017). One of the models that meets the criteria to increase the concept and communication skills is the Snowball Throwing learning model.

Snowball Throwing learning model is a model that is the result of development on discussion learning model (Basit & Maryani, 2020). In this model, the

learning process is done by combining discussions and games, with discussions students will interact with each other and share knowledge and also experience in solving a problem, with the student's game will feel moved and have the motivation to be active in the learning process (Handayani, Widyaningsih, & Yusuf, 2017). This learning model, the teacher will divide the students into several groups, each group is assigned to make question-and-answer of the material that has been studied in the paper, then the paper is shaped like a ball and then thrown to another student who has to work on the question on the paper (Kusumawati, 2017).

In physics education, there are still researchers who are creatively using snowball throwing models, however, no research found to improve the concept of physics education on the material of gas kinetic theory using snowball throwing snowball models.

Based on the background above, a study will be conducted entitled "Application of Snowball Throwing Model to improve Understanding of Concepts and Communication Skills in Gas Kinetic Theory Material" which aims to determine the influence of the application of snowball throwing learning model to improve understanding of concepts and communication skills.

METHOD

The type of research used is experimental research with *pre-experiment* design. The design of the research used is One Group *Pretest-Posttest* where before conducting the research, researchers give a *pre-test* to the group, then given a treatment or *treatment.* Then given *a post-test* to measure students' knowledge after treatment or can be seen in the Table 1.

Table 1 Experiment Design

Pre-test	Treatment	Posttest
O_1	X	O_2

The research was conducted in April 2021 for students of grade XI IPA SMA IT Nurul Jannah who were selected with *simple random sampling* techniques that are members of the population given the same opportunity to be selected into samples so that there are 23 students of grade XI IPA SMA IT Nurul Jannah as a sample of this research. Data collection techniques are performed using test instruments to get an overview of students' concept understanding and observation to measure students' communication skills.

In the concept understanding test instrument, there are seven indicators assessed, namely (a) Interpreting, (b) Exemplifying, (c) Classifying, (d) Summarizing, (e) Comparing, (f) Comparing, (g) Explaining (Novitasari, 2016).

On the observation sheet of communication skills there are three aspects assessed (Makiyah, Mahmudah, Sulistyaningsih, & Susanti, 2021), i.e., systematic/format, the use of language, as well as the completeness of the content and the order of content. Each aspect of the assessment has a maximum of 3 points and a minimum of 1 point with various conditions that can be seen in Table 2.

Table 2 Communication Skills Aspect Assessment

	Aspect Assessment	Scores
Systematics/ format	Ability to convey the ideas / results of the discussion in the framework but not yet complete.	1
	Ability to convey the ideas / results of discussions into a complete and systematic framework.	2
	Ability to convey ideas / results of discussions into a complete framework / whole, systematic and solid and smooth.	3

	Aspect Assessment	Scores
Language usage	Ability to respond to the expression of a friend's idea by asking, arguing, and giving input with short language.	1
	Ability to respond to the expression of a friend's idea by asking, arguing, and giving input with short polite and clear language.	2
	Ability to respond to the expression of the idea of friends by asking, arguing, and giving input with short, clear, and polite and communicative language.	3
Completeness of contents and order of contents	Ability to retell the points of the text in full even though it has not been sequential.	1
	Ability to retell the points of the text in full and sequentially but there are still points that do not fit the theme.	2
	Ability to retell the subject matter in full and in order according to the theme	3

The data obtained was analyzed using t-test to determine the difference between before treatment and after treatment and using N-gain to determine variable increase after treatment.

RESULT AND DISCUSSION

This snowball throwing learning model is a learning model that can train the answering and receiving of messages from others and train students in conveying a message to others. This model consists of six stages. The first stage is the delivery of goals and motivations and telling the material to be taught, the second stage is forming a group and appointing the chairman of the group, the third stage is to deliver the material to the chairman of the group and other group members learn independently first, the fourth stage is the chairman of the group delivers the material delivered by the teacher to his members and then writes the question on a piece of paper and then the paper is made to resemble a ball and the group must throw it to another group and the group that gets the throw must answer the question given, in the fifth stage that is an evaluation that gives the opportunity to the student to ask and the teacher will give an evaluation for the material delivered, then for the last stage that is the teacher gives an award to give reinforcement to the students.

Based on the results of the research conducted, there is an improvement in understanding the concepts and communication skills of students before applying the Snowball Throwing learning model and after applying the Snowball Throwing learning model.

The average understanding of the concept of gas kinetic theory material before the implementation of the snowball throwing learning model is 25,6 and then after the implementation of the snowball throwing learning model is raised to 57,4 or can be seen in Figure 1.
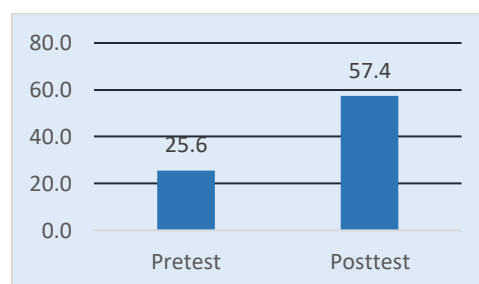

Figure 1 Students' Pretest and Posttest on The Kinetic Theory of Gases

Researchers also conducted t-tests to determine the difference in concept understanding before the implementation of snowball throwing learning models and after the implementation of snowball throwing learning models. The t-count obtained is 7,65, the magnitude is greater than the t-table with a confidence level of 5% of 2,07. Because t-count is greater than t-table then there is a difference, or improvement in concept understanding of gas kinetic theory material before and

after applying snowball throwing learning model.

The results of the t-test on concept understanding are listed in Table 3.

Table 3 Test t understanding concepts

t-count	7.65
t-table	2.07

N-gain is a test that aims to determine how much a variableincreases after treatment. On the understanding of the concept of N-gain obtained is 0,4 so that the category is moderate.

The average communication skills of students before applying the snowball throwing learning model is 45,41 and then the average after applying the snowball throwing learning model increases to 67,15.

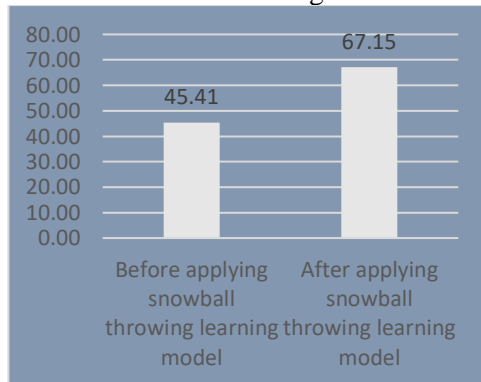The average communication skills of students can be seen in Figure 2.

Figure 2 Average Communication Skills Before and After Applying Snowball Throwing Learning Model

Similar to the application of concepts, communication skills were tested with t-tests to apply the difference between before and after applying the snowball throwing learning model. The result of t-count is 8.48 greater than t-table with a confidence level of 5% which is 207.

The results of the t-test on communication skill are listed in Table 3.

Table 4 T-test communication skill

t-count	8,48
t-table	2,07

Since t-counting is greater than t-table, then we can know that there is a difference, or improvement between communication skills before the application of snowball throwing learning model and after the application of snowball throwing learning model.

In the N-gain test the results were obtained against the improvement of student communication skills by 0.4 with a moderate category.

The results obtained in this study are in accordance with the results of previous research. Research on the application of learning models to influence the understanding of concepts in mathematics subjects resulted in that the model can influence the understanding of student concepts (Meika, Sujana, & Umami, 2017). In communication skills students also get the same results as previous research, namely research on improving communication skills with snowball throwing learning models on the composition material of functions and inverse functions (Suliswa et al., 2017).

In accordance with the statement that to improve the understanding of the concept by avoiding learning and focusing on the teacher, this snowball throwing learning model focuses on students, students will discuss with each other the structure of the concept of the material together with the guidance of the teacher. In addition, in the snowball throwing learning model also asks students to create and answer questions that will train the understanding of student concepts, the more practiced the concept of the material will be more mature (Salam et al., n.d.) . Similarly, to improve students' communication skills, which is to reduce teacher-centered learning, for example by group learning that will give students the opportunity to share their knowledge and experience (Suliswa et al., 2017), in accordance with the snowball throwing learning model because this learning model asks students to learn in groups and discuss so as to

provide opportunities for all students to communicate.

So we can conclude that snowball learning models can improve the understanding of concepts and communication skills, and this study proves that snowball throwing learning models can improve the understanding of concepts and communication skills in physics subjects, namely gas kinetic theory material.

CONCLUSION

Based on the results of the data analysis can be concluded that the application of the snowball throwing model can improve the understanding of concepts with a pretest average of 25,6 and then increase by a posttest average of 57,4, with an increase in understanding of concepts that are moderately categorized. Snowball throwing learning models can also improve students' communication skills, with an initial average of 45,41 and after the application of the model to 67,15, the communication skills of these students are improved by the moderate category.

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