

CHAPTER I

PRELIMINARY

1.1 Background

The learning process occurs in many ways and takes place all the time toward a behavior change in learners. The change is in the form of knowledge, understanding, skills, and habits that are acquired by the learners. Physics as one of the natural sciences is in the spotlight in the development of education, especially in school learning related to various scientific concepts, some of which are applied to improve problem-solving thinking skills that can be found in various occasion. (Maison et al., 2018;). Physics is a subject that is considered difficult and avoided by some students because it is very challenging, sometimes frustrating, and requires perseverance, thoroughness, and a lot of practice so not many students like physics (Abbas et al., 2018; Astalini, Kurniawan, & Putri, 2018; Putra et al., 2019). According to Anwar (2015), Attitudes towards science have gained great interest in science education, especially from the teaching and learning perspective. It has been noticed that students consider science to be a very difficult and boring subject. Students' interest decreases as they move into the upper classes of education.

The student's responses to physics subjects at Al Ulum Terpadu Islamic High School in Medan can be seen based on the initial observation data which are still low. Out of a total of 58 students in class X MIA 1 and X MIA 2, there were 59.5% of students still had low scores in physics lessons, 59.5% of students still had difficulty understanding physics lessons, 66.7% of students were not motivated in learning Physics, 47.6% of students feel bored when learning takes place, and 54.5% have difficulty doing assignments given by the teacher. This is following the results of interviews with physics teachers at SMA Islam Al Ulum Terpadu Medan. This means that most students are still less interested and still have difficulty in learning physics. One of them is because the learning model used by the teacher still uses the old method which makes students still lack mastery of physics subject matter. The use of learning media is monotonous and does not vary. Another cause

is the lack of motivation of the students themselves to study Physics because there is a kind of mechanism of thinking that Physics is difficult.

In general, physics learning in the classroom is carried out independently/individually, while some are taught in groups. Students study independently because the teacher instructs them to do so, and not all students can apply independent learning. There are various techniques that teachers can use in grouping students, such as applying cooperative learning. Cooperative learning refers to a collection of targeted strategies aimed at promoting collaboration among students during the learning experience. By engaging in cooperative learning, students can support one another in comprehending educational content and tasks, as well as enhancing their problem-solving skills. Isjoni (2009) describes cooperative learning as a model where students work together in small groups consisting of five members, formed with a diverse mix of participants. This approach to group learning adheres to specific guidelines. The fundamental concept of cooperative learning is that students create small groups in which they teach each other in pursuit of shared objectives.

There are various cooperative learning models that can be utilized in the educational process. Each model possesses distinct characteristics that can be tailored to specific learning environments or situations. For instance, the Jigsaw learning model is frequently employed when there are numerous topics to cover in a limited amount of time, allowing students to study in small, heterogeneous groups of 4-6 members. In the Jigsaw approach, students first form original groups before breaking into expert groups. However, in practice, not all students possess the same level of competence, resulting in not all group members receiving high grades. Another example is the Team Game Tournament (TGT) learning model. This TGT cooperative learning approach involves organizing students into study groups that engage in games at various tournament Tables. The game utilizes cards with questions and answers; nevertheless, in reality, not every student feels confident enough to speak up or share their thoughts. Consequently, during the tournament game, the responses tend to rely predominantly on one or two students within each

group. There are many other cooperative learning models as well, including Student Team Achievement Division (STAD), Number Head Together (NHT), Group Investigation (GI), Think Pair Share (TPS), and others. All these types of learning models have group members of 4-6 students, meaning there are 12-30 directions of information that must be considered in the group. This results in the possibility of miscommunication due to the lack of material that can be processed by students from the many directions of information heard and seen. As well as the emergence of student apathy in the group.

To solve the disadvantages of the conventional cooperative learning model, the TAPPS (Thinking Aloud Pair Problem Solving) model was proposed as a solution. The TAPPS model represents a form of cooperative learning that encourages students to engage actively in problem-solving. Initially introduced by Claparade, this model was subsequently utilized by Bloom and Bronder to analyze the problem-solving processes of high school students. Arthur Whimbey and John Lochead further developed this model for instructing students in Mathematics and Physics. In the TAPPS model, educators guide students to solve problems collaboratively in pairs while also teaching them to think critically and articulate their reasoning during the problem-solving process. The objective of this model is to help students conceptualize how to tackle a problem and articulate their ideas and thoughts toward finding solutions. Within this framework, students assume distinct roles, one acting as the problem solver and the other as the listener. The problem solver is tasked with resolving issues by clearly communicating their thought process, while the listener is expected to understand and follow the problem solver's reasoning.

The TAPPS model offers an advantage over other models by requiring problem solvers to articulate their reasoning, leading to more organized thought processes. Engaging in TAPPS dialogue fosters the necessary contextual framework that enhances student comprehension, enabling them to practice concepts, connect them to established frameworks, and develop a more profound understanding of the subject matter. This approach allows each student within the group the opportunity

to reflect independently, articulate their views clearly, and speak with confidence without the worry of being interrupted or judged by peers. Hartman, in Collaborative Learning Techniques (Barkley, 2012), describes TAPPS as a collaborative learning model where two to four students work together to address a problem. Each member of the group has specific responsibilities, while the teacher is advised to guide students according to the established procedures.

Given this background, implementing group division within the TAPPS learning model is anticipated to enhance the learning process, thereby improving students' learning outcomes. Consequently, it would be worthwhile to conduct research titled **“The Analysis of Group Division in The Thinking Aloud Pair Problem Solving (TAPPS) Learning Model to Improve Student Learning Outcomes on Momentum and Impulse Topic.”**

1.2 Identification of Problems

Based on the background of the above problems, the researchers identified the following problems:

1. Students are not engaged while learning in the classroom.
2. Students have low motivation/engagement in learning physics activities.
3. Teachers often use irregular teaching methods but the learning outcomes of the student are still unsatisfactory.
4. Teachers also use different teaching models, but high-potential students benefit more than low-ability students.

1.3 Limitations of Problems

To limit the issues in this research so that the study can be focused on and achieve the goals. The problems in this research are limited to:

1. The learning model used in this research is TAPPS
2. Utilize the TAPPS learning model to see students' problem-solving abilities

3. Student's learning outcomes in the momentum and impulse topics class X at SMA Islam Al Ulum Terpadu Medan
4. A learning method that can enhance student learning activities in submitting opinions
5. Group division the division of the group only ranges from 2-4 people per pair

1.4 Formulation of the Problem

Based on the background described above, the formulation of the problem in this study is:

1. What is the effect of group division in the TAPPS learning model on students' ability to solve problems on momentum and impulse topics?
2. Is there an improvement in students' problem-solving ability after group division in the TAPPS learning model applied?
3. What is the effect of the group division in the TAPPS learning model on students' learning outcomes on momentum and impulse topics?
4. Is there an improvement in the students' learning outcomes on momentum and impulse topics after group division in the TAPPS learning model applied?

1.5 Research Objectives

The research objectives of this study are:

1. To find out the effect of group division in the TAPPS learning model on students' ability to solve momentum and impulse problems.
2. To determine the improvement of students' problem-solving ability in momentum and impulse topics after group division in the TAPPS learning model is applied

3. To find out the effect of group division in the TAPPS learning model on students' learning outcomes in momentum and impulse topics
5. To determine the improvement in the students' learning outcomes on momentum and impulse topics after group division in the TAPPS learning model applied

1.6 Benefits of the Research

The advantages of this research include:

1. Theoretical

- a. It serves as a reference for other researchers who are also examining the analysis of group division within the TAPPS learning model to enhance educational outcomes on topics like momentum and impulse, or others.
- b. It provides alternative information on using the analysis of group division in the TAPPS learning model to improve learning results in momentum and impulse subjects.
- c. It acts as a reading source and contributes to the literature at Universitas Negeri Medan.

2. Practical

- a. For researchers, it offers experience related to group division analysis in the TAPPS learning model aimed to improve student's learning outcomes in momentum and impulse topics.
- b. Educators are encouraged to refine their teaching techniques to improve the educational system and offer the best possible service to students.
- c. For students, it introduces a new model to learn physics, making their learning experience more fulfilling and enjoyable.
- d. For schools, it provides insights that can guide them in taking a greater interest in subjects that may inspire students to engage more effectively in learning, particularly in physics.

1.7 Operational Definition

To prevent misunderstandings or ambiguity in meaning, the following definitions of key terms are essential for this study:

1. According to KBBI, analysis refers to the examination of an event (such as writing, actions, etc.) to uncover the actual situation (including causes, contexts, etc.). It involves breaking down a subject into its parts and exploring those parts and their interrelations to gain a clear understanding of the entire concept.
2. Thinking Aloud Pair Problem Solving (TAPPS) is a form of cooperative learning that encourages students to actively engage in problem-solving in pairs.
3. Learning Outcomes are closely linked to the nature of the learning process. These outcomes express the knowledge, skills, and competencies that individual students should demonstrate upon finishing a learning experience or series of learning activities.
4. Group Division pertains to classifications based on factors like class, social status, or profession. In this context, it acknowledges that students exhibit diverse abilities, with some progressing slowly and others more quickly. Hence, grouping is based on the understanding of these similarities and differences, aimed at ensuring a smooth and orderly teaching and learning process in schools.
5. The Analysis of Group Division in The Thinking Aloud Pair Problem Solving (TAPPS) Learning Model to Improve Student Learning Outcomes on the Topic of Momentum and Impulse is a study that aims to investigate how the division of groups within the TAPPS learning model can enhance student learning outcomes.