CHAPTER I
INTRODUCTION

1.1 Research Background

Science and technology are rapidly advancing, affecting every aspect of human life including education. Mathematics education has evolved alongside technology and is a fundamental component of the national education system, playing a crucial role in the development of science and technology. This is because mathematics fosters critical thinking skills and is essential for technological advancements.

Mathematics education has undergone expected changes in accordance with the challenges in the era of scientific and technological development. In this connection, efforts must be made to make mathematics learning more readily accepted by students in order to achieve better results.

Mathematics education needs to be given to all students starting from elementary school to equip students with the capacity to think intelligently, logically, deliberately, fundamentally, and imaginatively, as well as the capacity to cooperate. These skills are required so students can acquire, make due, and use data to get by in a steadily evolving, unsure, and cutthroat circumstance. (Permendiknas No. 22, 2006).

Problem-solving ability, reasoning ability, communication ability, connection ability, and representation abilities are the basic abilities that that are standardised in the learning process of mathematics by the National Council of Teachers of Mathematics (NCTM, 2000). Krulik and Rudnik (1996) stated that problem-solving ability is the ability to solve problems in previously unknown situations by using the knowledge, skills, and understanding that has been acquired. Problem-solving ability is the ability to carry out several activities such as observation, understanding, experimenting, guessing, discovery, and review to find

a method or approach to solving a problem. Problem-solving ability is a basic ability that is very important to understand because the problem-solving ability is useful as a means to solve problems in everyday life, as well as to shape individual mindsets and attitudes.

In light of the results of the PISA study in 2018, Indonesia ranks 72 out of 77 nations with a mathematical ability result of 379. The score obtained by Indonesia is still below the average, which is 489 (OECD, 2020). In addition, the results of the Trend in International Mathematics and Science Study (TIMSS), a study conducted by the International Association for the Evaluation of Educational Achievement (IEA) in 2015 placed Indonesian students in 44th position out of 49 participating countries and obtained a score 397, while the average international score is 500 (TIMSS, 2015). The low ranking of Indonesian students in PISA and TIMSS tests is due to their limited ability to solve non-routine or difficult questions. Most Indonesian students can only answer level 1 and 2 routine questions, which is insufficient for the range of questions tested in PISA (Mariani & Susanti, 2019). Based on the low results of the PISA and TIMSS tests for Indonesian students, it can be said that the problem-solving ability of Indonesian students is low. Furthermore, a research conducted by Novriarni & Surya (2017) also showed that the problem-solving abilities of class VIII students in one school were still relatively low. Students are unable to solve problems by fulfilling each indicator of problem solving ability and the average percentage of students is 54.48% and belongs to the less category.

Low problem-solving ability in Indonesia is caused by factors such as lack of experience, motivation, and inadequate teaching materials that hinder the development of mathematical problem-solving ability (Dewi et al. 2021).

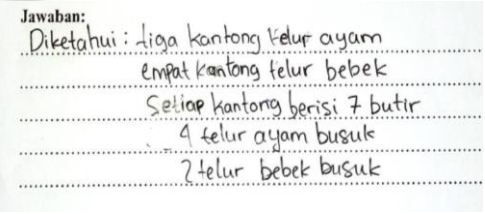
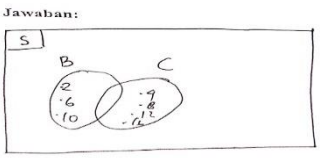
Therefore, the ability to solve mathematical problems is a fundamental capacity that should be created and scholarly in each subject of learning mathematics. The importance of problem-solving abilities to be perceived was likewise stated by Sirait & Siagian (2017) that problem-solving abilities are fundamental in mathematics education because: (1) students become capable at picking related data, then examining it lastly re-actually look at the outcomes;

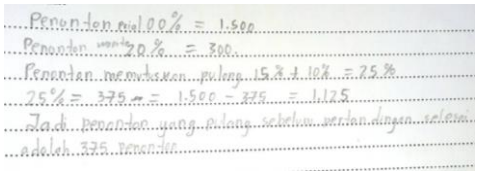
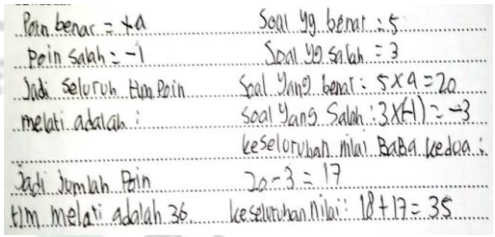
(2) scholarly fulfillment will show up from inside is a characteristic reward for students; (3) the increment of students' intellectual potential; (4) students figure out how to make disclosures by going through the most common way of making disclosures.

In an interview with a mathematics teacher at SMP Negeri 37 Medan, it was stated that online learning for two years has resulted in low mathematics ability among students. Some students have not grasped basic mathematical concepts and have not had the opportunity to solve mathematics problems. In addition, many students were unenthusiastic and uninterested when learning mathematics. The teacher stated that mathematics learning activities are teacher-centered and hinder students from taking an active role. Group discussions also do not run smoothly due to a lack of participation, which negatively affects problem-solving ability in class VII of SMP Negeri 37 Medan.

Furthermore, the researcher conducted a diagnostic test on 31 class VII-A students of SMP Negeri 37 Medan. The test consists of four questions and represents indicators of problem-solving abilities.

Table 1.1 Student's Answer in Diagnostic Test

Num	Questions	Students' Answer
1	Nabilah bought three bags of chicken eggs and four bags of duck eggs. Each bag contains seven eggs. After opening, it turned out that there were four chicken eggs and two rotten duck eggs. From the questions above, write down the things that are known from the problem!	 Students are able to make things that are known in the problem.
2	If B = {an even number is less than 18} C = {a multiple of 2 is less than 18}, draw the sets B and C in the venn diagram and determine the intersection of the sets B and C!	 Student is still making mistake in devising a plan indicator.

3	A football match was attended by 1,500 male spectators. The number of female spectators is 20% of the number of male spectators. At 45 minutes, 15% of the crowd decided to go home. At the 60th minute of the match, it turned out that 10% of the rest of the audience had also decided to go home. How many spectators left before the match was over?	 Students are still making mistake in solving the problem correctly.
4	A quiz contest was followed by three teams. Each team will get +4 points for answering the question correctly and -1 point for answering the question wrongly. In the first round, Team Melati scored 18. In the second round, Team Melati answered 5 correct questions and 3 wrong questions. According to Dinda, the score the Melati Team got at the end of the second round was 38. Dinda calculated the Melati Team's final score by adding up the scores in the first and second rounds. While Nia has a different opinion. According to Nia, the total score obtained by the Melati Team at the end of the second round was 35. As the arbiter of Dinda and Nia's answers, in your opinion, whose opinion is the most correct? Give your reasons!	 Students can solve the problem, but they cannot review the problem. This can be seen from the fact that non-responding and correct students can count the team's grades.

The results of the students' answers above show that the problem-solving abilities of class VII-A students SMP Negeri 37 Medan is still low and each problem-solving indicator has not been fulfilled. Question number one is a question to see indicators of understanding the problem. There were 13 students (42%) with very high ability, 6 students (19%) with medium ability, and 12 students (39%) with

very low ability. The typical score of students' ability in understanding the problem is 67,67. Question number two is a question to see indicators of devising a plan. There were 0 students (0%) with very high ability, 7 students (23%) with medium ability, and 24 students (77%) with very low ability. The average score of students' ability in devising a plan is 20,48. Question number three is a question to see the indicators of carrying out the plan. There were 0 students (0%) with very high ability, 4 students (13%) with medium ability, and 27 students (87%) with very low ability. The average score of students' ability in carrying out the plan is 19,29. Question number four is a question of looking back indicator. There were 6 students (19%) with very high ability, 7 students (23%) with medium ability, and 18 students (58%) with very low ability. The average score of students' ability in looking back is 30,64. The average result of the diagnostic test for the problem-solving ability of class VII-A students of SMP Negeri 37 Medan is 36,29. Based on this information, it can be concluded that the problem-solving ability of class VII-A students of SMP Negeri 37 Medan is still classified as very low.

Thus, an effort is needed to further develop students' problem-solving abilities. One of the efforts that can be made to improve students' problem-solving ability is to apply a learning model that is oriented towards students' problem-solving abilities. The results of research conducted by Wardani & Rajagukguk (2015) and Astuti (2016), the cooperative learning model STAD type can improve students' mathematical problem-solving abilities. The results of research conducted by Pasalbessy et al. (2020), concluded that the cooperative learning model STAD type has a good influence on improving students' problem-solving abilities compared to the direct learning model.

In the cooperative learning STAD type, students are divided into groups of 4 or 5 pupils of different ability, gender and ethnicity. A teacher conducts the lesson and the students are divided into groups to ensure that all individuals of the group have dominated the lesson. At long last, all students complete individual quizzes on the material, although they may not be able to help each other at that time. Students' test scores are compared to their previous averages and grades are awarded according to how much they have improved or how far they have deviated from their previous results (Nurdyansyah & Fahyuni, 2016). STAD consists of five main

components, namely: (1) class presentations, (2) teams, (3) quizzes, (4) individual improvement scores, and (5) group recognition.

By implementing the STAD cooperative learning model, students are given the opportunity to enhance their problem-solving ability through collaborative efforts. This approach promotes the sharing of answers and open discussions about varying perspectives, all while receiving support from the teacher. Overall, the cooperative learning model STAD type is an effective means of fostering a more engaging and productive learning environment.

Referring to the opinion of the cooperative learning model STAD type is a learning model that gives students time to discuss in groups, take roles to understand learning materials, and give awards to teams that reach certain criteria, thus the cooperative learning model STAD type can act as a facilitator in improving students' problem-solving abilities.

Based on the description above, the researcher feels that it is necessary to conduct research with the title "The Implementation of Cooperative Learning Model STAD Type to Improve Students' Problem-Solving Ability in Class VII at SMP Negeri 37 Medan".

1.2 Problem Identification

Based on the background that has been described, several problems can be identified as follows:

1. Students do not understand the basic concepts of mathematics.
2. Students are not enthusiastic and not interested when learning mathematics and group discussions did not run well because none of the students stood out during the lesson.
3. The low problem-solving ability of class VII-A students of SMP Negeri 37 Medan in terms of the percentage of each indicator of solving ability on the student diagnostic test. There were 13 students (42%) with very high ability, 6 students (19%) with medium ability, and 12 students (39%) with very low ability. The average score of students' ability in understanding the problem is 67,67. There were 0 students (0%) with very high ability, 7 students (23%)

with medium ability, and 24 students (77%) with very low ability. The average score of students' ability in devising a plan is 20,48. There were 0 students (0%) with very high ability, 4 students (13%) with medium ability, and 27 students (87%) with very low ability. The average score of students' ability in carrying out the plan is 19,29. There were 6 students (19%) with very high ability, 7 students (23%) with medium ability, and 18 students (58%) with very low ability. The average score of students' ability in looking back is 30,64.

4. The learning model that has been applied during mathematics learning cannot improve the problem-solving abilities of class VII-A students of SMP Negeri 37 Medan.

1.3 Scope of Study

The scope of this research focuses on improving the problem-solving abilities of class VII students at SMP Negeri 37 Medan through the implementation of cooperative learning model STAD type. This research is a classroom action research which is characterized by the presence of research stages in the form of cycles that aim to improve students' ability in solving mathematical problems through the cooperative learning model STAD type. The subjects in this research are class VII-A students of SMP Negeri 37 Medan. The data source used in this research is the primary data source obtained directly at the research location.

1.4 Problem Limitation

Based on the problems that have been described, the researcher needs to provide limitation for the problem to be studied so this research is more focused and the research purposes can be achieved. The problems in this research are limited to the implementation of the cooperative learning model STAD type to improve the problem-solving ability of class VII-A students of SMP Negeri 37 Medan on data presentation material.

1.5 Research Questions

Based on the problem limitation above, the research questions are as follows:

1. How is the improvement of problem-solving ability of class VII students at SMP Negeri 37 Medan after using cooperative learning model STAD type?
2. How is the classical completeness of class VII students at SMP Negeri 37 Medan through the cooperative learning model STAD type on problem-solving ability?

1.6 Research Objectives

Based on the research question above, the objectives of this research are as follows:

1. To find out the improvement of problem-solving ability of class VII students at SMP Negeri 37 Medan after using cooperative learning model STAD type.
2. To find out the classical completeness of class VII students at SMP Negeri 37 Medan through the cooperative learning model STAD type on problem-solving ability.

1.7 Research Benefits

1. Theoretical Benefit

   This research is expected to have positive impact and provide additional insight for other researchers in learning mathematics, especially in increasing students' problem-solving ability.
2. Practical Benefits
   1. For Teachers

      Providing insight and reference about cooperative learning model STAD type to improve students' problem-solving ability.

2. For Students

   Providing a learning experience in which students actively participate in learning activities to improve their ability to solve mathehamtical problems.

3. For School

   Can be used as one of the input materialin improving the quality of mathematics learning process.

4. For Researcher

   Can be used as additional reference, insight, and experience as professional teacher in the future.