

## Problem-Solving Skills' Analysis of High School Students in Medan on Reproductive System Material

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### ABSTRACT

Education in the 21st century aims to build the ability of students' intelligence in learning to solve problems in everyday life. This study aims to determine students' problem-solving ability in the field of reproductive system and investigate the factors that influence it. This study used quantitative research with descriptive method and involved 29 students. Data was collected through distributing questionnaires with 32 statements and 10 essay questions on problem solving ability to determine the truth of descriptive statistics and analyze the factors that influence students' problem solving ability and their data. Data analysis reveals that 63% of one private high school in Medan's average presentation of the questionnaire's problem-solving skills falls into the sufficient category. While the test results of the problem solving ability analysis questions on the material of the human reproductive system, MAS the school obtained an average of 43% including in the very weak category. Students' problem solving ability is fairly weak due to several factors that influence it, namely the lack of student learning motivation, the ability to solve problems that are empowered has not been maximized.

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## 1. INTRODUCTION

In the 21st century, problem-solving ability is one of the abilities that students have to measure the limits of their ability to understand learning materials. (Redhana, 2019). Problem solving skills are related to the ability to search, select, evaluate, organize, and consider various alternatives and interpret information. (Tendrita et al., 2016). Problem solving skills are important to improve the quality of human resources (Liantoni & Cahyani, 2017). Problem solving skills benefit students by helping students solve daily life problems and develop themselves. (Mulyati & Cahyati, 2020) improve students' understanding of the material and connect it to real life and improve students' analytical and synthesis skills (Abbas et al., 2021).

The ability to understand lessons and apply them in real-life problem solving is one of the indicators of successful learning. Therefore, students are expected to be able to demonstrate the ability to analyze & solve complex problems. Considering the nation's challenges in the future which are increasingly competitive, problem solving skills are very important for students. (Mulyati & Cahyati, 2020). The low problem-solving ability of students can result in the low quality of human resources. Therefore, teachers are required to be able to choose the right learning methods and models so that students' problem-solving skills can be realized. Changes in teaching strategies need to be made so that learning is not teacher-centered but student-centered, so that students tend to be active in finding their own answers or solutions to problems and applying them in everyday life. (Fitmawati et al., 2018). Based on this description, the ability to solve problems is so important for social life because it can help solve various problems faced, so analyzing the ability to solve problems at the SMA / MA level students' needs to be studied early.

Biology learning is one of the fields of study that requires the ability to solve problems. This is reflected in the basic competencies of biology Curriculum 2013 which requires students to be able to solve problems in each learning material, because biology is a subject that studies natural symptoms related to everyday life. One of the biology learning materials is the reproductive system material in class XI. The human reproductive system studies the reproductive organs in men and women, the functions of these reproductive organs, the hormones that

play a role in them, pregnancy, and the effects that arise when someone does not maintain their reproductive organs properly so that it will cause problems in the body. Moreover, reproductive organs develop during adolescence (Husna Nafila et al., 2016) Therefore, learning biology must use strategies that refer to being able to hone students' problem-solving skills. (Amirullah & Susilo, 2018)

Therefore, learning biology must use strategies that refer to being able to hone the ability to solve problems. Research that discusses the analysis of students' Biology problem solving skills is not new to research and has been widely carried out including research conducted by Devi (2019), analyzing students' problem solving skills on ecosystem material (Elvianasti et al., 2022) Nahdi (2018) Husna Nafila et al. (2016) dan Supiandi & Julung (2016), analyzing Biology problem solving skills on environmental change material. Based on this, it is still rare to analyze the ability to solve problems on reproductive system material.

Analysis of problem-solving ability is a relevant aspect to be explored in the context of learning human reproductive system material. The ability to solve problems involves students' ability to identify problems, analyze relevant information, find solutions, and evaluate the resulting solutions.

Based on previous interviews with one of the biology teachers at MAS MUHAMMADIYAH 1 Medan school, he said that the learning model used in students had been carried out previously with problem-based learning models such as PBL, but not all students were able to follow the learning model or had difficulty understanding a given problem, this shows that not all students have the same problem-solving ability. Factors such as educational background, motivation and interest can affect students' ability to solve problems. Therefore, it is necessary to conduct an in-depth analysis to understand the extent of the problem-solving ability of grade XI students in dealing with human reproductive system material.

Therefore, this study aims to analyze the problem-solving ability of students in grade XI reproductive system material. So, this research is important to do in order to know the extent of the students' problem-solving ability, especially in reproductive system material. Then the benefits of this research after knowing the results of students' ability to solve problems can be done a way of learning models that are appropriate in order to be a reference to improve the ability to solve problems in students.

## 2. RESEARCH METHOD

### Type of Research

This type of research is a type of quantitative research with descriptive methods. Descriptive research is research to find facts with the right interpretation. The data in this study will be analyzed quantitatively. The purpose of using descriptive research methods with this quantitative approach is to find out the problem solving ability of MAS Muhammadiyah 01 Medan class XI students in Medan city in the form of descriptions and percentages.

### Research Procedures

#### 1. Research Sources

Data is collected by researchers to answer research questions. In this study, the answers to the data were obtained from the results of interviews with one of the Biology teachers at MAS Muhammadiyah 1 Medan based on the ability to solve problems in students and filling out questionnaires and essay questions given to students of class XI MAS Muhammadiyah 1 Medan.

#### 2. Research Instruments

To get the correct data for conclusions that are in accordance with the actual situation, a valid and consistent instrument is needed, namely in the form of essay questions made with indicators of problem solving ability, among others, namely 1. Define the problem, 2. Examine the problem, 3. Plan the problem, 4. Implement the plan that has been made and 5. Evaluate (Mourtos et al., 2004). To collect data, the researcher conducted an interview with one of the biology teachers at MAS Muhammadiyah 1 Medan, besides that, data was also collected through filling out questionnaires by students of MAS Muhammadiyah 1 Medan.

##### a. Questionnaire

In this study, the questionnaire was addressed by researchers to students at MAS Muhammadiyah 1 Medan class XI. There are 32 statements that will be filled in by students to explore the understanding and ability of MAS Muhammadiyah 1 Medan class XI students to solve problems.

##### b. Problem Solving Ability Essay Questions

There are 10 essay questions based on the ability to solve problems in Biology subject matter of the Human Reproductive System given by researchers to each student.

##### c. Interview

Interview is a conversational process conducted by researchers with a specific purpose with guidelines, and can be face-to-face or through certain communication tools. In this study, the only resource person used was the biology teacher to see how effective biology learning with human reproductive system material.

#### 3. Data Analysis Technique

##### a. Questionnaire data analysis

The questionnaire contains 32 statements presented by the researcher with the aim of knowing the level of problem solving ability in students. Respondents' answers to the questionnaire were measured using a Likert scale. The Likert scale is a scale used to measure the attitudes, opinions, and perceptions of a person or group of people about social phenomena, so that it can broadly explore the answers to various researcher statements. The guidelines or grids used in making questionnaires are in accordance with Hatmalik's indicators in Mourtos et al. (2004)) as follows:

1. Defining the Problem
    - a) Mentioning facts related to existing problems related to the human reproductive system
    - b) Describe the problem accordingly
    - c) Demonstrate understanding of the concepts concerned
    - d) Uses information from the student's background knowledge to understand the given information
  2. Checking the Problem
    - a) Determine the real object of the problem
    - b) Make clear and reasonable assumptions/estimates
    - c) Retrieve, organize, recall and re-evaluate information that has been provided
  3. Plan a Solution
    - a) Developing a problem-solving plan
    - b) Define sub-problems
    - c) Select theories, principles and approaches to solve related problems
    - d) Determine info that needs to be found
  4. Implementing the Plan
    - a) Make a decision (for the case/problem to be solved)
    - b) Examine the solution that has been made and look for additional information or clarification
    - c) Analyze methods or design a method to meet a specific goal.
    - d) Diagnose and propose solutions
  5. Evaluated
    - a) Evaluate solutions from different perspectives, try to formulate solutions and make them acceptable to the community.
    - b) Provide a rationale for the solution.
- b. Analysis of Problem Solving Ability Essay Questions

The data was analyzed by researchers by finding the percentage of the average score on each indicator obtained by students of MAS Muhammadiyah 1 Medan class.

### 3. RESULT AND DISCUSSION

The research was carried out at the MAS 1 Muhammadiyah Medan school. According to the Biology teacher at this school and also the subject of this research, it is stated that for class XI there is only one science class and in 1 class there are 31 people in class problem solving abilities or problem solving skills and as a result there are only a few students who can be said to be able to take part in problem solving ability based learning. From the learning results based on problem solving ability, it is still very poor, but there are some students who are capable, although only 1 or 2 indicators of problem solving ability are capable, this is because the students' desire to learn or motivation to learn is also very low.

#### 1. Results of Questionnaire Analysis of Problem Solving Ability of MAS Muhammadiyah 1 Medan students.

The results of the problem-solving ability questionnaire obtained by students of MAS Muhammadiyah 1 Medan. Can be shown in the table below:

Table 1. Questionnaire analysis data of Problem Solving Ability

NO	Problem Solving Ability Indicator	Presentage
1	Defining the Problem	68%
2	Checking the Problem	69%
3	Planning the Solution	59%
4	Implement the Plan that has been made	56%
5	Evaluate	65%
<b>Avarange</b>		63%
<b>Category</b>		Enough

Based on table.1 above, the questionnaire results obtained from MAS Muhammadiyah 1 Medan students on indicators 1) Defining the problem obtained a percentage of 68%; 2) Examine the problem by 69%; 3) Plan a solution by 59%; 4) Implement the plan that has been made by 56%; 5) Evaluate 65%. Then the average percentage of 5 indicators of the ability to solve problems through questionnaire calculations at MAS Muhammadiyah 1 Medan is 63% with a category of enough

## 2. Results of Problem Solving Ability Analysis of MAS Muhammadiyah 1 Medan students

The results of the analysis of the problem-solving abilities of MAS Muhammadiyah 1 Medan students were obtained by researchers from testing questions based on problem-solving abilities as in table 2:

Table 2. Problem Solving Ability Analysis

No	Problem Solving Ability Indicator	Percentage
1	Defining the Problem	79%
2	Checking the Problem	65%
3	Planning the Solution	59%
4	Implement the Plan that has been made	43%
5	Evaluate	14%
	<b>Avarange</b>	43%
	<b>Category</b>	Very Weak

Based on Table 2, the results of the problem-solving ability analysis of MAS Muhammadiyah 1 Medan students were obtained from testing the problem-solving ability questions on the material of the human reproductive system. The results obtained from students of MAS Muhammadiyah 1 Medan are in the indicators, 1) Defining the problem by 79%; 2) Examine the problem by 65%; 3) Plan a solution by 59%; 4) Implement the solution made by 43%; 5) Evaluate by 43%. So that MAS Muhammadiyah 1 Medan gets the average percentage results on testing the ability to solve problems on the material of the human reproductive system of 43% so that it falls into the category of very weak problem solving ability.

## Discussion

Based on the results of the problem-solving ability questionnaire of MAS 1 Muhammadiyah Medan students, it shows different results from each indicator. This can be proven by researchers through the average percentage obtained. These differences can be caused by various things, such as the learning methods used by teachers, based on observations that have been made by researchers at school on the learning model used by biology teachers, they tend to do learning by recording learning in pdf books and handbooks held by students only in the form of LKS books. This is due to the technological advancements that have developed in this era, so that the learning done in class affects the student's ability. Then the zoning system that is enforced in the school and the activities that are in the school itself, so that it also greatly affects the academic ability of students. Students' academic ability is a description of the level of knowledge or ability of students to the learning material that has been learned and can be used as a provision or capital to obtain broader and more complex knowledge, so it can be referred to as academic ability. (Tendrita et al., 2016).

Data from research conducted by researchers at MAS Muhammadiyah 1 Medan through interviews with Biology teachers, filling out questionnaires and testing essay questions on problem solving skills by students. The results obtained from filling out the questionnaire by students get a percentage with an average of 63%. Included in the sufficient category, while the results of testing essay questions on the ability to solve problems on reproductive system material get an average percentage of 43%, including the very weak category. This means that the questionnaire results are higher than the results of the test of the essay question on the ability to solve problems of MAS Muhammadiyah 1 Medan students. Overall, the results of the student questionnaire sheet show that students are able to understand the questions. This can be seen from the average value obtained which shows that the questionnaire instrument is included in the sufficient category. There are three indicators of problem solving ability, of which are included in the high category, namely indicators of defining problems, examining problems and evaluating. These indicators can help students in solving challenges. Problem solving skills useful when solving complex and multidimensional challenges can be developed in active learning that engages students (Mahanal et al., 2022)

In the indicator essay question 1) defining the problem, students got 79% in the high category. Based on the results of the interview, students were able to master this indicator because students were familiar with the learning applied by the teacher on this indicator so the results were quite good. . In the indicator questionnaire 2)

Checking Problems, students got a percentage result of 65%, which was included in the sufficient category, this shows that it is not much different from the results of the first questionnaire indicator. The results of the interview also explain that biology learning at MAS 1 Muhammadiyah 1 Medan is also used to this indicator so the results are not too bad. Then, in the results of the indicator questionnaire 3) Planning a solution, students got 59%, which was included in the weak category. The questions given in this indicator instruct students to study the problem along with its solution and the theory used to solve the problem. The results of this indicator show that students have difficulty answering the questions on this indicator because MAS Muhammadiyah 1 Medan students usually only examine problems without looking for solutions and theories that will be used to solve problems. In indicator 4) Implementing the solution created, the percentage of 43% was in the weak category, lower than the previous indicator, this was because students were not able to master the previous indicator, namely planning a solution, so in the indicator of implementing the solution, students were increasingly unable to answer it. In indicator 5) Evaluating, students obtained a result of 14%, which is included in the very weak category. In this indicator, students are assigned to check the feasibility of the solution, make assumptions regarding the solution, estimate the results and choose the right media to convey and communicate the solution.

This is what causes the percentage of essay question instruments to be lower than questionnaire sheet instruments. Another condition that occurs in essay questions is that there is 1 indicator which is included in the high category, namely defining the problem and 1 other indicator which is included in the sufficient category, namely examining the problem, while the indicators of planning a solution, implementing the solution created and evaluating, are included in the very weak category. The indicator for defining the problem obtained high results because in understanding the problem the students already understood the situation. This is in line with the opinion of Iffah & Masruroh (2019) that the ability to understand problems is a student's first step in solving problems, to recognize problems students must have "knowledge" about the situation. This condition can occur because students feel that when answering questions they are in accordance with the statements on the questionnaire sheet which contains the steps for working on the questions. However, in reality, when working on questions, students do not actually do it according to the statements on the questionnaire sheet. According to Fan & Zhu (2021) if students have difficulty understanding the task, it will be more difficult for them to comment in describing the steps they are taking clearly and completely.

According to Alrahlah (2016) students can understand a problem if students can analyze and describe the meaning of the problem. This ability is the first step for students in working on problem solving problems. If students experience errors in analyzing problems, then students will have difficulty in solving problems. Based on the explanation above, it proves that students' confidence in problem solving ability is higher than their abilities. From the results of the researcher's interview with the Biology teacher of MAS Muhammadiyah 1 Medan said that Biology learning that is usually applied by teachers rarely applies problem solving skills-based learning to students. The result of rarely applying problem solving skills-based learning is that students' abilities are still very weak. Many shortcomings in the learning process using the problem solving method include student activeness in finding data to solve problems provided by researchers is still not visible, there is still a lack of enthusiasm of some students in conducting experiments with tools and materials that have been provided, there is still no visible discussion activities between students in problem solving efforts (Hanifa et al., 2018)

According to NCTM, the thinking process in learning includes five main standard competencies, namely problem solving ability, reasoning ability, connection ability, communication ability and representation ability. This low ability will result in low quality of human resources, which is demonstrated in low problem solving abilities. This is because so far learning has not provided opportunities for students to develop their abilities in solving problems (Cahyani & Setyawati, 2016). One way that teachers can improve students' problem-solving abilities is by training and getting used to the application of problem-solving ability-based learning, such as giving HOTS questions to students. HOTS (*Higher Order Thinking Skills*) is measure higher-order thinking skills, use contextual-based problems, diverse questions, not familiar or routine, and descriptions (Markhamah, 2021). The HOTS question is one that can be used to measure students' ability to solve problems. Because the result of the HOTS questions is to solve the problem. So by giving HOTS questions, students' ability to solve problems can be measured (Ilhamsyah et al., 2021). So teachers should be able to empower students' problem-solving abilities. This lack of empowerment of problem-solving abilities will be considered trivial because it is rarely implemented due to students' weak problem-solving abilities. It would be better for teachers to find solutions on how to empower students' problem-solving abilities.

According to Sam & Qohar (2016), there are five stages in the problem-based learning model. Namely, students are introduced to the problem, students are directed to study in groups, students investigate independently and in groups, namely by collecting data and conducting experiments, and students are directed to present the results of their discussions and analyze and evaluate existing problems. settlement process. which has been done. In the final stage, the teacher's role is to help students explore and assess their thinking processes in investigations and intellectual skills used in problem solving.

One of the problems used in the problem-based learning model is to increase students' understanding of a problem because the first step in solving a problem according to Polya is that students must understand the



problem first (Aini & Mukhlis, 2020). Apart from that, the final step in implementing the problem-based learning model is evaluating the problem solving process that has been carried out. The use of a problem-based learning model helps students solve problems. This is in accordance with the research results, namely that the indicators defining the problem and the indicators examining the problem are included in the sufficient criteria.

Then the use of media in problem-based learning is also very important to produce deeper student understanding. In the learning context, multimedia means the use of various types of media in delivering material to receive messages or teaching material optimally and optimally by students who have different learning modalities (Shalikhah, 2017). Therefore, multimedia representations have the potential to produce deeper learning and understanding than presentations presented in one format, for example presenting material only in the form of words or images (Nahdi, 2018) Therefore, through the use of multimedia learning media, students will be more helped in the learning process which will help them solve a problem. On the other hand, if there is no role of the teacher, such as the absence of the use of learning media that can support the acceptance of the concept of the subject matter, then students will have difficulty solving a problem.

#### 4. CONCLUSION

Based on the results of the research that has been done, it can be concluded that the questionnaire results of the ability to solve problems of MAS Muhammadiyah 1 Medan students obtained an average of 63%, including in the sufficient category. While the results of the problem-solving ability analysis test on the material of the human reproductive system, MAS Muhammadiyah 1 Medan obtained an average of 43% including in the very weak category.

Based on the results of the analysis of students' problem-solving ability which is fairly weak, it is caused by several factors that influence it, namely the lack of student learning motivation, the ability to solve problems that are empowered has not been maximized because the teacher has not found an effective way to apply it, resulting in very weak problem-solving skills possessed by students. One way that teachers can empower students' problem solving skills is by training students to work on HOTS questions. Then apply the appropriate learning stages in problem-based learning by using a problem-based learning model, then use appropriate learning media, so that the use of various types of media in delivering material to receive messages or teaching material optimally and optimally by students who have different learning modalities different. Based on the observations of researchers at MAS Muhammadiyah 1 Medan school, some of the recommended methods can improve students' problem solving skills. then through the use of multimedia-type learning media, students will be more assisted in the learning process of solving a problem, so it is useful to improve students' problem solving skills.

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