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ANALYSIS OF REPRESENTATIVE ABILITY BY USING GUIDED INQUIRY LEARNING MODEL IN REVIEW OF GENDER STUDENTS IN MTsN

Nurul Rafiqah Nasution[1], Wahyudin[2]

[1]Universitas Pendidikan Indonesia, Jl. Dr. Setiabudi No 229, Bandung, Indonesia.
rafiqahnurul13@gmail.com
[2]Universitas Pendidikan Indonesia, Jl. Dr. Setiabudi No 229, Bandung, Indonesia.
wahyudin.mat@upi.edu

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ABSTRACT

Based on the results of PISA and TIMSS, the mathematical ability of Indonesian students is at the cognitive knowing level which is the lowest level. This study aims to analyze: (1) students' mathematical representative ability through, and (2) the difficulty of representative experienced by students in solving problems of representative ability. The method of this study is qualitative research. The results showed: (1) students with high representative ability in terms of male and female genders were able to present pictures to solve problems. Students with the ability to represent are being viewed from male students who have not been able to aspects of words or written texts. Whereas female students are not yet capable of aspects of visual representative and the written words. Students with low representative ability in terms of male gender have not been able to visual present images. Then, aspects of mathematical expressions and written words have not been able to make mathematical model and written words. (2) the difficulties experienced by male students in solving problems of representative ability experiencing difficulties in terms of principles, verbal aspects and procedural terms. While the female students experiences difficulties in terms of concepts, aspects of principles, aspects of verbal and procedural terms. The conclusion in this study: female students in the high ability category more than male students. In the medium ability category, male students more than female students. In the low ability category, female students more than male students

Corresponding Author:

Nurul Rafiqah Nasution,
Department of Mathematics Education,
Universitas Pendidikan Indonesia,
Jl. Setiabudi No 229, Bandung, Indonesia
Email: rafiqahnurul13@gmail.com

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INTRODUCTION

National Council of Teachers of Mathematics (2000) stipulates five basic mathematical abilities that must be mastered by students in learning mathematics. (1) ability solution to problem (problem solving), (2) reasoning (reasoning), (3) communication (communication),

(4) connection (connections) and (5) representation (representation). One of the abilities that need to be developed among students is the ability of mathematical representation. Mathematical representation ability is the most important cognitive aspect to be developed because it is used as a basis in learning. This statement is in accordance with the NCTM (2003) that "representation is a special ability needed in learning mathematics".

According to Kilpatrick et.al (2001) that “Representations are useful tools that support mathematical reasoning, enable mathematical communication, and convey mathematical thought”, meaning that mathematics needs representation as a tool to help explain/communicate further in mathematics. Jones and Knuth (in Hudiono, 2007) stated representation, "A model or alternate form of a problem situation or aspect of a problem situation used in finding a solution. For example problem can be represented by objects, pictures, words or mathematical symbols”, meaning a model or alternative of a problem or aspect of a problem that is used to find a solution. For example, problems can be represented by objects, pictures, words or mathematical sentences.

In general, there are three types of representation used in problem solving. (1) the ability of mathematical representation of language is the ability to translate the observed properties and their relationship in mathematical problems into verbal or verbal representations, (2) the ability to represent mathematical images or graphs is the ability to translate mathematical problems into image or graphic representations and (3) the ability of mathematical representation of arithmetic symbols is the ability to translate mathematical problems into the representation of mathematical formulas (Hwang et.al, 2007).

Although the ability to represent mathematics is one of the abilities that students need to possess, in fact, based on the results of interviews with teachers of mathematics subjects, it was found that students are rarely given the opportunity to present their own representations. Students tend to imitate the teacher's way of solving problems which results in students' mathematical representation abilities being undeveloped.

This is also in line with the preliminary studies that have been carried out by student researchers who have difficulties in solving mathematical representation ability questions which can be seen from students' errors in solving mathematical representation ability test questions as follows. (1) difficulty using visual representations (pictures) to clarify problems, (2) difficulty in making mathematical models and (3) difficulties in using mathematical models to solve mathematical problems. The causes of students' errors in solving the mathematical representation problems are not being careful in reading the questions, weaknesses in analyzing problems, being less thorough and having difficulty connecting between concepts.

Therefore, the ability of mathematical representation gets the full attention of the teacher so that it is easier to obtain solutions to mathematical problems. This was stated by Surya and Nur (2015) that "mathematical representation skills are needed by students to find and create a tool or way of thinking in communicating mathematical ideas of abstract and concrete nature, so that students are easy to understand".

Other factors that can contribute to the ability of mathematical representation in learning mathematics are gender. Research conducted by Triyadi (2013) in his research entitled mathematical ability in terms of differences gender suggested that the majority of male students' mathematical abilities were below female students' mathematical abilities. This is in line with the results of Dewi's research et.al (2017). Increased mathematical representation ability in the low and medium categories, male students were higher than female students and there were no male students who had high mathematical representation abilities but there were female students who had high mathematical representation abilities. The ability of mathematical representation to make mathematical models and explain verbally, male students is higher than female students. While the mathematical representation ability to make tables and make pictures, female students are higher than male students.

One of the causes of the low ability of mathematical representation is influenced by the learning approach used by the teacher. Most teachers still use the lecture method and assignment. This causes students to tend to be passive, only receive information, students rarely ask questions about the material presented and students also often have difficulty solving problems. In addition, teachers are pursued by targets to complete each subject regardless of the competence of their students.

To realize quality education, a learning model is needed, namely the learning model Guided Inquiry. Guided inquiry learning model is an inquiry learning model in which the teacher provides guidance or guidance that is broad enough for students. In the guided inquiry learning process, the teacher does not just let go of the activities carried out by students. The teacher provides direction and guidance to students in carrying out activities so that students who have low intelligence are able to follow the activities being carried out and students with high intelligence do not monopolize activities. Therefore, teachers must have good classroom management skills.

According to Febriawan et.al (2016) teaching and learning process with guided inquiry, Students are required to find concepts through the necessary instructions from a teacher. These instructions are generally in the form of questions that lead to the development of research activities carried out by students. The teacher also provides necessary explanations when students are going to do the experiment.

In learning guided inquiry, the role of the teacher as follows. (1) choosing problems or learning materials to be studied by students and (2) planning experiments. On the other hand, the role of the student is. (1) carry out the experiment, (2) find the concept or principle based on the data obtained from the experimental results and (3) provide an explanation of the data obtained from the experimental results (Febriawanet.al, 2016).

Based on the background of the problem above, the researcher was motivated to do researchwith the title “Analysis Of Representative Ability By Using Guided Inquiry Learning Model In Review Of Gender Students In MTsN”.

METHOD

This type of research used in this research is qualitative research. The subjects in this study were students of class VIII-7 MTsN 1 Medan which consisting of twenty four female students and twelve male students. While the object in this study is the ability of representative, and difficulties experienced by students in solving problems of representative ability through the application of guided inquiry learning models in terms of gender. The instruments include tests of mathematical representation abilities, mathematical disposition questionnaires and interview guidelines. The instrument get validated by measuring the validity, reliability and Likert Scale. This data is obtained from the results of student answers. The answer process in solving the problem is viewed from several things, namely: (1) student errors in solving the given mathematical problem, (2) the steps used by students in solving the given problem and (3) the suitability of the student's answer process with indicators. The process of each student's answer was analyzed based on the category of his assessment. Analyze the data until get the purposes of this study by student answer sheets were analyzed to take the subject who was interviewed and the student who was selected as the subject of the interview would be interviewed.

Interviews were conducted on research subjects, both teachers and students, conducted once by referring to the interview guide that had been adjusted to the results of the student answer sheets in completing the tests of students' mathematical representational abilities and dispositions towards mathematics. In conducting interviews, researchers filtered as much data as possible by using field notes or voice recordings to find out the steps taken by students in solving problems and the difficulties experienced by students in answering the mathematical representation ability test. The data obtained from the voice recordings were transcribed and combined with the field notes obtained.

RESULT AND DISCUSSION

RESULT

1. Analysis of The Ability of High Capability Representative in Terms of Male Gender

The answer to the ability of high capability representative in terms of male gender is on the S-12 subject as follows:

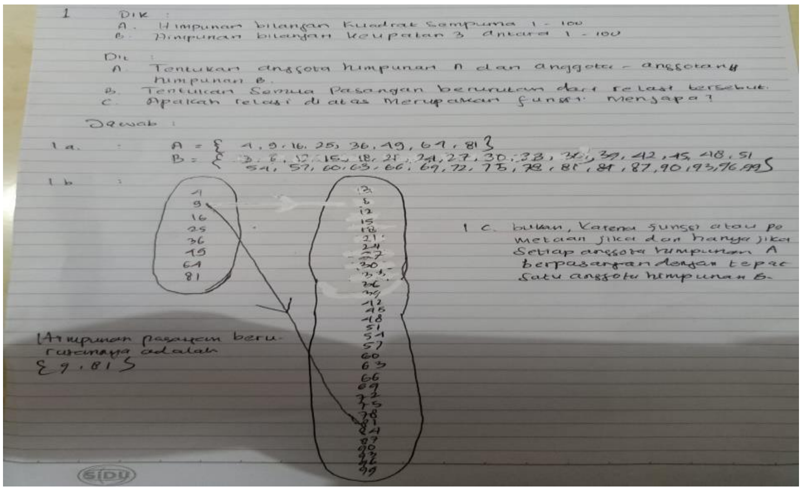
1 Dik :
A. Himpunan bilangan kuadrat sempurna 1 - 100
B. Himpunan bilangan kelipatan 3 antara 1 - 100
Dit :
A. Tentukan anggota himpunan A dan anggota - anggota himpunan B.
B. Tentukan semua pasangan berurutan dari relasi tersebut.
C. Apakah relasi di atas merupakan fungsi? Mengapa?
Jawab :
1 a. : A = { 1, 9, 16, 25, 36, 49, 64, 81 }
B = { 3, 6, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45, 48, 51, 54, 57, 60, 63, 66, 69, 72, 75, 78, 81, 84, 87, 90, 93, 96, 99 }
1 b. :
Himpunan pasangan berurutannya adalah { 9, 81 }
1 c. bukan, karena fungsi atau pemetaan jika dan hanya jika setiap anggota himpunan A berpasangan dengan tepat satu anggota himpunan B.

Figure 1. The Answer To The Ability Of High Capability Representative In Terms Of Male Gender

Based on the results of the written test above, it can be concluded that (1) aspects of visual representation; Subject S-12 has been able to describe it into arrow diagrams by pairing each member of set A and member of set B and is able to write down the set of consecutive pairs of arrow diagrams that he has made, (2) aspects of equations or mathematical expressions; Subjects S-12 already know the set of members of A and the set of members of B and write down all of the set of members of A and the set of members of B, and (3) aspects of words or written text; Subject S-12 has written down the reason that the arrow diagram drawing is not a function.

2. Analysis of The Ability of High Capability Representative in Terms of Female Gender

The answer to the ability of high capability representative in terms of female gender is on the subject of S-23 as follows:

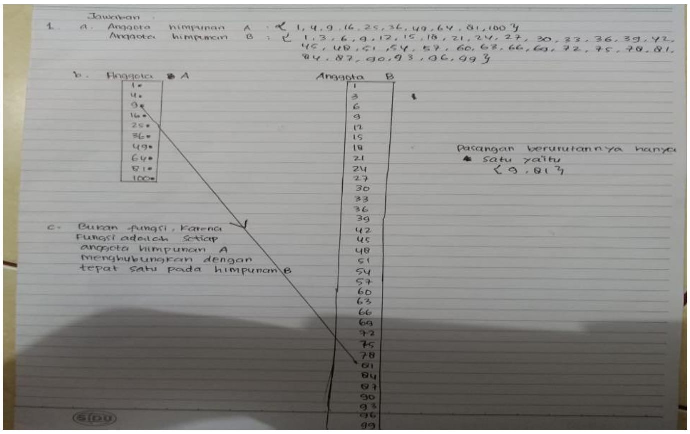

Figure 2. The Answer To The Ability Of High Capability Representative In Terms Of Female Gender

Based on the results of the written test of the subject of S-23 above, it is found that (1) aspects of visual representation; Subject S-23 has solved the problem correctly and paired each member of set A to member of set B by means of an arrow diagram and wrote down the consecutive pairs from the arrow diagram, (2) aspects of equations or mathematical expressions; Subjects S-23 can write down the set of members of A and the set of members of B, and (3) aspects of words or written text; Subject S-23 can provide good reasons to strengthen his opinion about non-function.

3. Analysis of The Ability of Representative of Being Evaluated from Male Gender

The answer to the ability of representative of being able to test the ability of representative is on the subject S34.

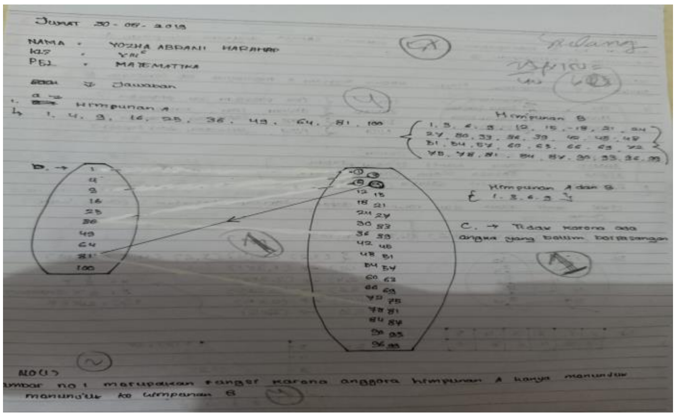

Figure 3. The Answer To The Ability Of Representative Of Being Able To Test The Ability Of Representative Of Male Gender

Based on the results of the S-34 subject written test above, it can be seen that (1) aspects of visual representation; Subject S-34 was able to make a diagram by pairing each member of set A to members of set B and was able to write down the consecutive pairs, (2) aspects of mathematical equations or expressions; Subject S-34 writes down the set of members of A and the set of members of B, and (3) aspects of words or written text; Subject S-34 was not able to provide a good reason to substantiate his opinion regarding non-function

4. Analysis of The Ability of Representative of Being Evaluated from Female Gender

The answer to the ability of representative of being able to test the ability of representative is on the subject S38.

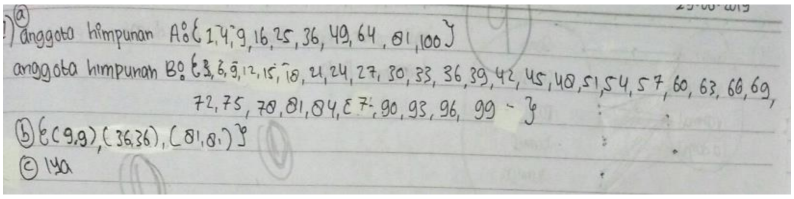

Figure 4. The Answer To The Ability Of Representative Of Being Able To Test The Ability Of Representative From Female Gender

Based on the results of the S-38 subject written test above, it can be seen that (1) aspects of visual representation; Subject S-38 made a pair of sequential but still wrong and did not make an arrow diagram to solve the problem, (2) aspects of equations or mathematical expressions; Subject S-38 already knows and is able to write down the set of members of A and the set of member B, and (3) aspects of words or written text; Subject S-38 was unable to give reasons for what he wrote.

5. Analysis of The Ability of Low Ability Representative in Terms of Male Gender

The answers to the ability of low ability representative with the ability to test the representative of the subject S7.

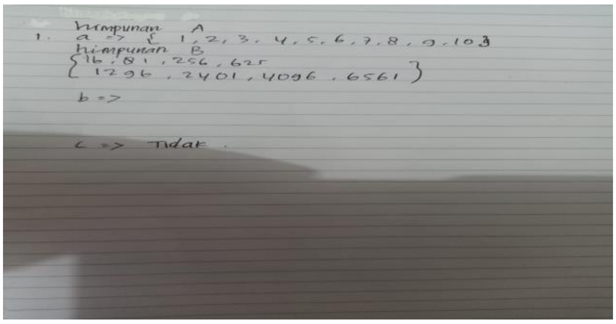

Figure 5. The Answers To The Ability Of Low Ability Representative With The Ability To Test The Representative Of Male Gender

Based on the written test results of S-7 subjects above, it appears that (1) aspects of visual representative; S-7 subjects cannot understand and use appropriate visuals in representing mathematical problems, (2) aspects of equations or mathematical expressions; Subject S-7 is not able to make mathematical model equations from the problems given correctly, and (3) aspects of words or written text; Subject S-7 is not able to use representative to answer questions using words or written text.

6. Analysis of The Ability of Low Ability Representative in Terms of Female Gender

The answers to the ability of low ability representative with the ability to test the representative test are on the S33 subject as follows:

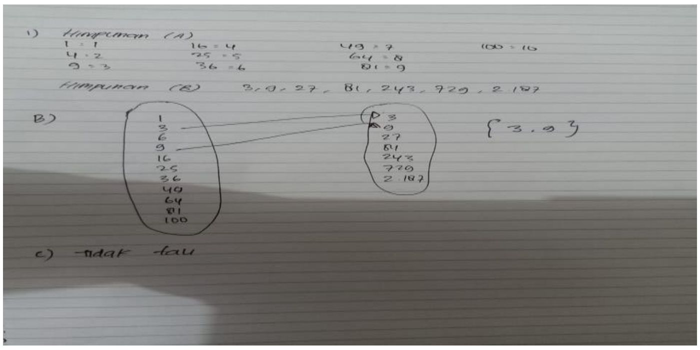

Figure 6. The Answers To The Ability Of Low Ability Representative With The Ability To Test The Representative Test Of Female Gender

Based on the written test results above, it was concluded that (1) aspects of visual representative; Subject S-33 has presented the arrow diagram but how to pair each member of set A to the set member B is not correct, (2) aspects of equation or mathematical expression; Subject S-33 is not correct in writing members of set A and set members B, and (3) aspects of words or written text: Subject S-33 does not know the concepts of relations and functions so that it is unable to use representative to answer questions using words written words or text.

7. *Representative Difficulties Experienced by Students in Resolving the Problem of Representative Ability by Using a Guided Inquiry Learning Model Viewed From Male Gender*

Based on the results of the student's representation ability test, it was found that the difficulties experienced by students in solving representational ability questions can be seen from several aspects as follows.

Table 1. Aspects Of Students' Difficulty In Solving Representation Ability Problems In Terms Of Male Gender

No.	Indicator	Description
1.	Difficulty In Learning Concepts	Students have no difficulty in making equations or mathematical models of the problems given
2.	Difficulties In Applying Principles	Students find it difficult to make sequential pairs because they do not present the arrow diagram
3.	Difficulty In Solving Verbal Problems	Students find it difficult to use written text to answer problems
4	Difficulties in the procedure	Students are not able to present the completion steps correctly

8. *Representative Difficulties Experienced by Students in Resolving the Problem of Representative Ability by Using a Guided Inquiry Learning Model Viewed From Female Gender*

Based on the results of the student's representative ability test, it is found that the difficulties experienced by students in solving the problem of representative ability can be seen from several aspects as follows:

Table 2. Aspects of Student Difficulties in Resolving Problems of Representative Ability in Terms of Female Gender

No.	Indicator	Description
1.	Difficulty In Learning Concepts	Students have difficulty making equations or mathematical models of the problems given
2.	Difficulties In Applying Principles	Students have difficulty making arrows diagrams so that the sequential pairs are incorrect
3.	Difficulty In Solving Verbal Problems	Students have difficulty using written text words to answer problems
4	Difficulties In The Procedure	Students are not able to present the completion steps in an orderly and correct manner

DISCUSSION

1. *High Ability Mathematical Representation Skills in terms of Male Gender and Female Gender*

Based on these three aspects, overall S-12 and S-23 subjects have abstract, ordered (systematic) thinking processes, have high imagination, high ability to understand concepts in solving problems and solving problems accompanied by pictures (arrow diagrams). and the mathematical model. This is in accordance with research conducted by Riastuti et.al (2016: 5) which states that subjects with high cognitive abilities have high imaging, high conceptualization, high problem solving. and high problem seeking.

2. *Mathematical Representation Ability is Moderately Able to be Seen from Male Gender*

S-34 subjects with moderate mathematical representation abilities were also able to determine the things that were known and the things that were asked from question number 1. The three aspects of mathematical representation ability could be solved, although the aspects of words or written texts were not correct. Subject S-34 has good visual mathematical representation skills by making arrow diagrams using the "root of" rule and is able to write down the consecutive pairs.

Likewise with the aspect of equations or mathematical expressions, subject S-34 is able to write down each set of members of A and set of members of B, but in the aspect of words or written text, subject S-34 has written down the reason but it is still wrong due to inadequate understanding of the concept. strong enough to be unable to provide a good reason to strengthen his opinion about non-function. This is in line with the opinion of Maccoby and Jakclyn (1985: 245) who say that women's verbal abilities are higher than men's, and men's visual spatial abilities are better than women's.

3. *The Ability of Mathematical Representation is Able to be Seen from the Gender of Women*

S-38 subjects with moderate mathematical representation abilities were able to determine the things that were known and the things that were asked from question number 1. When viewed from the three aspects of mathematical representation ability, only one aspect could be done by S-38 subjects, namely aspects mathematical equations or expressions. This is because the subject of S-38 already knows the concept of perfect square numbers so that they are able to write down the set of members of A and the set of members of B.

As for the visual representation aspect, subject S-38 was still wrong in making consecutive pairs and did not make arrow diagrams to solve the problem. This is in line with the research of Dewi et.al (2017: 120) which says that male students have higher mathematical mathematical representation abilities than female students. This means that the ability of visual mathematical representation in making pictures of male students is higher than that of female students and the aspect of written words or written texts, the subject of S-38 is less able to give proper reasons.

4. Low Mathematical Representation Ability in terms of Male Gender

S-7 subjects with low mathematical representation ability do not understand the problem and have not been able to elaborate according to mathematical principles and even their mathematical representation ability is not good. It can be seen based on three aspects of mathematical representation ability.

a. Aspects of Visual Representation. S-7 subjects cannot understand and do not use the right visual (picture) in representing mathematical problems. After the interview, S-7 found out where his mistake was in answering the question.
b. Aspects of Mathematical Equations or Expressions. The subject of S-7 is not able to make the equation of the mathematical model of the problem given correctly, resulting in the solution of the problem that is done by S-7 that is not correct and precise.
c. Aspects of Words or Written Text. S-7 subjects are not able to use visual representations to answer questions using words or written text. This can be seen from the students' answers that are not appropriate to give reasons.

5. Low Mathematical Representation Skills in terms of Female Gender

The subject of S-33 has not been able to solve the problem according to the indicators of mathematical representation ability. It can be seen as follows:
a. Aspects of Visual Representation. Subject S-33 has made an arrow diagram but how to attach each member of set A to members of set B using the "root of" rule is not correct.
b. Aspects of Mathematical Equations or Expressions. Subject S-33 is not able to make mathematical model equations from the given problem.
c. Aspects of Words or Written Text. Subjects S-33 do not know the concepts of relations and functions so they are unable to use representations to answer questions using words or written text.

6. Representation Difficulties Experienced by Students in Solving Mathematical Representation Ability Problems in terms of Male Gender

Representation difficulties experienced by students in solving problems of mathematical representation ability are in terms of concepts, principles, verbal and procedures. In terms of concepts, students who are viewed from the male gender have no difficulty in understanding the concept. This can be seen from students knowing the members of set A and members of set B so as to produce equations or mathematical models of each of its member sets correctly. In terms of principle, students who are viewed from the male gender experience difficulty in making consecutive pairs because they do not make arrow diagrams to represent mathematical problems.

In terms of verbal, students who are viewed from the male gender have difficulty in giving reasons for the answers they have written, resulting in the completion of the answers that are not correct. In terms of procedures, at this stage, students who are viewed from the male gender are inaccuracy in presenting mathematical representation abilities so that they do not get effective and efficient results.

7. Representation Difficulties Experienced by Students in Solving Mathematical Representation Ability Problems in terms of Female Gender

Representation difficulties experienced by students in solving problems of mathematical representation ability are in terms of concepts, principles, verbal and procedures. In terms of concepts, students do not know the members of set A and members of set B so they are not able to make equations or mathematical models of each of its member sets.
Principles. Students who are viewed from the female gender have difficulty in making consecutive pairs because they are wrong in pairing the set of members of A and the set of members of B.

Verbal aspect. Students who are viewed from the female gender do not understand the concept, have difficulty in giving reasons for the answers they have written.

In terms of procedure. Students who are viewed from the female gender do not use the completion steps in a sequential and correct manner so that they do not get effective and efficient results.

This is in accordance with Waskitoningtyas' research (2016:12) which shows that the percentage of students' difficulties in terms of facts is 14.4%, students' difficulties in terms of concepts are 56.9%, students' difficulties in terms of skills are 42.2% and students' difficulties are in terms of skills. principle of 76.7%. Based on the results of the percentage of difficulties experienced by students, the highest is in terms of principle of 76.7% because many students find it difficult to apply the principles they have learned and it is difficult to apply them in solving problems.

8. Mathematical Disposition in terms of Gender

Based on the results of the mathematical disposition questionnaire data analysis, the average mathematical disposition score in terms of male gender on the self-confidence indicator is 7.32; flexible indicators and try various alternatives in solving problems of 2.47; the indicator of being diligent in doing mathematical tasks is 6.11; the indicator shows interest and curiosity of 5.05; indicators for monitoring and reflecting on mathematics performance/learning are 5.05; the indicator assesses the application of mathematics by 6.58; and the indicator of appreciation for the role of mathematics is 5.05.

While the average score of mathematical disposition in terms of female gender on the self-confidence indicator is 9.17; flexible indicators and try various alternatives in solving problems of 3.05; the indicator of being diligent in doing mathematical tasks is 7.35; the indicator shows interest and curiosity of 5.79; indicators for monitoring and reflecting on mathematics performance/learning are 6.67; the indicator assesses the application of mathematics by 8.29; and the indicator of appreciation for the role of mathematics is 6.88. This shows that the use of the guided inquiry learning model has an impact on the average score of students' mathematical dispositions.

A good mathematical disposition will make students more confident in solving problems, especially in mathematics. Sinaga (2014: 125) states "a person who has a high mathematical disposition has high self-confidence, it will certainly foster confidence in his curiosity in solving math problems. Someone who has a high mathematical disposition will always try to take various actions and be ready to face difficulties.

Guided inquiry learning model helps students become motivated and enthusiastic in learning so that students' dispositions also improve, because the guided inquiry learning model is student-centered rather than teacher-centered conventional learning. This is in accordance with what was stated by Syahputra and Suhartini (2014:177) "in the guided inquiry learning model, the learning that has been taught by the teacher is converted into student-centered learning, so that students are given the opportunity to find and develop mathematical knowledge that will become theirs."

The mathematical disposition of students arises from various challenges and obstacles that are often felt by students, so that the experience creates self-confidence in each student. In terms of answering questions or taking exams that are often given by good teachers, students with a high mathematical disposition will be diligent and thorough in solving them. If students do not get answers to the problems they want to solve, they must always discuss with teachers and peers who understand better, so that any difficult problems can always be solved properly.

CONCLUSION

1. Ability to represent using learning models guided inquiry in terms of gender as follows:
   a. Students with high representation ability in terms ofgender men and women have been able to present pictures to solve problems, have written down the set of members of A and the set of members of B and are able to explain the reasons by using words or written text.
   b. Students with representational abilities are being reviewed fromgender Men have not been able to understand the aspects of words or written text due to a lack of understanding of the concept of presenting functions in the form of arrow diagrams. While in terms ofgender women are not yet capable of visual representation and written words or text.
   c. Students with low representation ability in terms ofgender men have not been able to the three aspects of representational abilities, namely aspects of visual representation, equations or mathematical expressions. While in terms ofgender women in the aspect of visual representation have presented images but are still wrong. In the aspect of equations or mathematical expressions and written words or texts have not been able to solve problems
2. The difficulties experienced by students in solving representational ability problems using learning models guided inquiry in terms of gender men experience difficulties in principle, verbal and procedural terms. Whereasgender women experience difficulties in terms of concepts, principles, verbal and procedural aspects.

Based on the results of the research and the conclusions mentioned above, the following suggestions can be given:

1. For students, it is hoped that the guided inquiry learning model will increase students' enthusiasm in learning because students are required to actively discuss and explain the results of their work well.
2. For teachers, it becomes a reference for mathematics teachers regarding the application of guided inquiry learning models as an alternative to improve students' mathematical representation abilities and mathematical dispositions to be better by improving weaknesses and shortcomings.
3. For schools, it is necessary to hold socialization in introducing guided inquiry learning models to teachers and students.
4. For researchers, provide an overview or information about students' mathematical representation abilities and mathematical dispositions using the guided inquiry learning model based on gender.

5. For other researchers who want to conduct research to measure mathematical representation ability and mathematical disposition, pay more attention to indicators of mathematical representation ability and mathematical disposition and can be used as a reference in conducting other similar studies to obtain better results.

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