STUDENTS' REPRESENTATION PROFILE IN SOLVING HOTS-BASED PROBLEMS IN CLASS VIII OF SMPN 3 TOLITOLI BASED ON GENDER

Tri Nur Khasanah[1], Alfisyahra[2], Pathuddin[3], Rita Lefrida[4]
Tadulako University, Jl. Soekarno Hatta No.KM. 9, Tondo, Kec. Mantikulore, Palu City, Central Sulawesi 94148
(0451) 422611, Indonesia
e-mail: nurkhasanahtri4@gmail.com

Abstract

This study aims to describe the students' representation profile in solving Higher Order Thinking Skills (HOTS) based problems on chance material in class VIII of SMPN 3 Tolitoli, in terms of gender. The representations studied include three aspects: visual, verbal, and symbolic. This research used descriptive method with qualitative approach. The research subjects consisted of two students with high mathematical ability, one male student and one female student. Data were collected through HOTS-based tests and in-depth interviews. The results showed that male students tended to excel in visual and symbolic representations, able to present data in the form of diagrams and solve problems using mathematical expressions well. On the other hand, female students are more dominant in verbal representations, especially in writing down interpretations and solution steps in detail. This research emphasizes the importance of a representation-based learning approach to improve students' higher order thinking skills, taking into account the characteristics and advantages of each subject.

Keywords: representation, hots, gender

Abstrak

Penelitian ini bertujuan untuk mendeskripsikan profil representasi siswa dalam menyelesaikan soal berbasis Higher Order Thinking Skills (HOTS) pada materi peluang di kelas VIII SMPN 3 Tolitoli, ditinjau dari jenis kelamin. Representasi yang diteliti meliputi tiga aspek: visual, verbal, dan simbolik. Penelitian ini menggunakan metode deskriptif dengan pendekatan kualitatif. Subjek penelitian terdiri atas dua siswa dengan kemampuan matematika tinggi, masing-masing satu siswa laki-laki dan satu siswa perempuan. Pengumpulan data dilakukan melalui tes berbasis HOTS dan wawancara mendalam. Hasil penelitian menunjukkan bahwa siswa laki-laki cenderung lebih unggul dalam representasi visual dan simbolik, mampu menyajikan data dalam bentuk diagram serta menyelesaikan masalah menggunakan ekspresi matematis dengan baik. Di sisi lain, siswa perempuan lebih dominan pada representasi verbal, khususnya dalam menuliskan interpretasi dan langkah-langkah penyelesaian secara rinci. Penelitian ini menekankan pentingnya pendekatan pembelajaran berbasis representasi untuk meningkatkan kemampuan berpikir tingkat tinggi siswa, dengan memperhatikan karakteristik dan keunggulan masing-masing subjek.

Kata kunci: representasi, hots, jenis kelamin

INTRODUCTION

Mathematics needs to be given to students to equip them with the ability to think logically, analytically, systematically, critically, and creatively as well as the ability to work together (Dahlia et al., 2020). Through math lessons, students are required to think logically and creatively to be able to solve a math problem.

In solving a math problem, students must be able to design a picture or model to make it easier for them to get the right solution. Representation is part of the activity of designing

something that represents the problem, thus in the process of finding a solution or answer to a problem, students first need to make a representation (Lette and Manoy, 2019).

Mathematical representation is closely related to the provision of HOTS questions. To solve a problem, students are required to be able to convert to a form of representation so that students must be able to do: 1) HOTS analysis, which is categorizing the necessary patterns, 2) HOTS creation, where students are involved in creating visual representations with symbolic representations, 3) HOTS evaluation, where students are involved in analyzing the results obtained to match the predetermined criteria (Tajudin and Chinappan, 2016).

According to research conducted by Norairi, et al. (2022), it was found that students with high mathematical ability were able to reexpress data from written text into a clear representation of solving fraction story problems. Students with medium and low mathematical abilities have difficulty in re-expressing data from written text into problem solving representations. This is reinforced in research conducted by Hanafi, et al. (2019) showed that students who have high mathematical ability have a very good level of ability to analyze and evaluate and students are quite capable of creating work by combining elements into a whole. It can be concluded that students with high mathematical ability are able to work on HOTS type problems.

From the results of observations and interviews conducted with one of the mathematics teachers at SMPN 3 Tolitoli, opportunity material is one of the materials that make students make mistakes, especially in understanding, solving and writing errors in the final answer. There are still many students who are still confused in writing what is known and what is asked, doing the problem is not in accordance with what is asked in the problem, and the most common error found is the error in operation. These errors are closely related to students' representation skills.

Based on the above background, the researcher is interested in conducting a study with the title "Students' Representation Profile in Solving HOTS-Based Problems in Class VIII of SMPN 3 Tolitoli Based on Gender".

METHODS

This type of research is descriptive research with the approach used is a qualitative approach. This research aims to describe students' representation profile in solving HOTS-

based problems in class VIII SMPN 3 Tolitoli from male and female students who have high mathematical ability.

This research was conducted at SMPN 3 Tolitoli. This location was chosen based on information provided by one of the mathematics teachers regarding students' representation difficulties in solving HOTS-based problems on chance material, so this school was chosen as a research site located on Jl. Sultan Hasanuddin No. 49, Panasakan, Kec. Baolan, Tolitoli Regency, Central Sulawesi. This research was conducted in the academic year 2024/2025 odd semester.

The subjects in this study were 2 students of class VIII SMPN 3 Tolitoli consisting of one male student with high mathematics ability and one female student with high mathematics ability. Students' mathematical ability was determined based on math ability tests and teacher interviews. In this study, the selection of subjects was chosen based on the rating scale set by Ratumanan and Laurens (in Rusminati dan Styanada, 2020):

Table 1. Math Ability Rating Scale

Math Ability		
High	**Medium**	**Low**
$80 \leq$ skor tes ≤ 100	$65 \leq$ skor tes < 80	$0 \leq$ skor tes < 65

The data collection techniques in this study were through tests and interviews. The test contains HOTS-based tests on chance material, which must be completed by the research subject. After the research subject finished working, the next interview was a direct meeting between the researcher and the research subject, because the researcher wanted to further confirm the stages of representation that had been carried out through the previous HOTS-based test and asked questions to the research subject to dig deeper information about his answers.

This research uses member check, extended observation, and dependability to test the credibility of the data. The data analysis technique used in this study refers to the data analysis technique of Miles, et al. (2014) which includes Data Condensation, Data Display, Conclusion Drawing/Verification.

RESULTS AND DISCUSSION

Subject GJA

Figure 1. Answer Sheet of Subject GJA

In the first indicator of visual representation, the subject made a picture to solve the problem, namely by making a Venn diagram from the information that had been obtained from the problem. The subject can also explain clearly about the venn diagram he made. It was also explained that the subject made a venn diagram to facilitate understanding, identification, and calculate opportunities more precisely without relying on assumptions. So that the male student subject who has high mathematical ability (GJA) is able to restate a problem by creating or modifying a direct pictorial representation of the problem well.

In the second indicator of symbol representation, after knowing the meaning and what information is in the problem, the subject makes a memorization using mathematical symbols or expressions correctly. However, at the completion stage, the subject did not write down the steps and only focused on the operation because it was considered unnecessary. So that the male student subject who has high mathematical ability (GJA) has not been able to restate a problem by formulating a symbolic expression of a problem properly.

In the third indicator of verbal representation, after knowing the meaning and what information is in the problem, the subject does not write in words what is known from the problem and immediately generalizes it with symbols because he feels unnecessary. At the completion stage, the subject also did not write down the steps with symbols or words and only focused on the operation. However, the subject wrote a conclusion after obtaining the value of x and wrote a conclusion on the final answer, namely the value of the odds. So that

the male student subject who has high mathematical ability (GJA) has not been able to restate a problem in words in writing according to his speaking style properly.
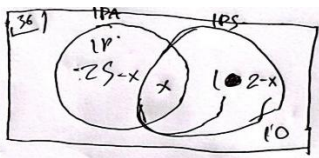
The tendency of mathematical representation used by male students cannot only be seen from the written answers on the answer sheet but can also be seen from the results of the interview, because the solution strategy is only written briefly. From the results of interviews conducted by researchers, it can be seen that male students are able to explain the steps of solving completely and precisely, which are not all written on the answer sheet. During the interview, male students explained their understanding briefly, concisely, and clearly. It appears that in the thinking ability of male and female students, there is no significant difference. This is in line with research conducted by Sugiono (2018) that in solving problems male students use a short solution strategy according to the results of the answers written on the answer sheet, therefore, it is not uncommon for male students to be vulnerable to not being thorough.

Subject GRR

Figure 2. Answer Sheet of Subject GRR

In the first indicator of visual representation, the subject made an image to solve the problem, namely by making a Venn diagram from the information that had been obtained from the problem. The subject can also explain clearly about the venn diagram he made. It was explained that the GRR subject made a venn diagram to see the relationship between sets to make it easier to calculate more precisely. So that the female student subject who has high mathematical ability (GRR) is able to restate a problem by creating or modifying a direct pictorial representation of the problem well.

In the second indicator of symbol representation, after knowing the meaning and what information is in the problem the subject makes a memorization using mathematical symbols or expressions, but does not formalize all information due to lack of accuracy in working on the problem. At the completion stage, the subject did not write down the steps and focused on the operation because it was deemed unnecessary. So that the female student subject who has high mathematical ability (GRR) has not been able to restate a problem by formulating a symbolic expression of a problem properly.

In the third indicator of verbal representation, after knowing the meaning and what information is in the problem, the subject does not write in words what is known from the problem and immediately generalizes it with symbols because he feels unnecessary. At the completion stage, the subject also did not write down the steps with symbols or words and only focused on the operation. However, the subject wrote a conclusion after obtaining the value of x and wrote a conclusion on the final answer, namely the value of the odds. So that the female student subject who has high mathematical ability (GRR) has not been able to restate a problem in words in writing according to her speaking style properly.

The tendency of female students' mathematical representation also cannot only be seen from the written answers on the answer sheet but can also be seen from the results of the interview, because the ability to convey the opinions of female students is better. From the results of interviews conducted by researchers, female students gave more complicated explanations in their own words than male students who only answered briefly and clearly. Interviews conducted with female students also tend to be longer, because more subjects do not write down strategies in solving problems than male students. Cahyono (2017) states that girls, in general, excel more in the fields of language and writing, while boys excel more in the field of mathematics. This is also supported by research conducted by Anggraeni and Herdiman (2018) obtained the results that female students are less thorough and incomplete in writing problem solving steps, but at the stage of implementing the plan the ability of women is better than men even though there are less in other stages.

CONCLUSION

The male student subject who has high mathematical ability fulfills one representation indicator, namely the subject is able to restate a problem by creating or modifying a direct

pictorial representation of the problem well. But the subject has not been able to restate a problem by formulating a symbolic expression of a problem well and also has not been able to restate a problem in words in writing according to his speaking style well.

The female student subject who has high mathematical ability fulfills one representation indicator, namely the subject is able to restate a problem by creating or modifying a direct pictorial representation of the problem well. But the subject has not been able to restate a problem by formulating a symbolic expression of a problem well and also has not been able to restate a problem in words in writing according to his speaking style well.

REFERENCES

Anggraeni and Herdiman. (2018). Kemampuan Pemecahan Masalah Matematik Siswa SMP pada Materi Lingkaran Berbentuk Soal Kontekstual Ditinjau dari Gender. In *Jurnal Numeracy* (Vol. 5). https://doi.org/10.46244/numeracy.v5i1.293

Cahyono. (2017). Analisis Ketrampilan Berfikir Kritis Dalam Memecahkan Masalah Ditinjau Perbedaan Gender (Vol. 8, Issue 1).

Dahlia, et al. (2020). Pengaruh Interactive Learning terhadap Minat Belajar Siswa pada Penjumlahan Operasi Hitung Bilangan Bulat (Vol. 7, Issue 4). http://ejournal.upi.edu/index.php/pedadidaktika/index

Hanafi, et al. (2019). Analisis Kemampuan Siswa dalam Menyelesaikan Soal High Order Thinking Ditinjau dari Kemampuan Awal Matematis Siswa. http://dx.doi.org/10.31000/cpu.v0i0.1681

Lette and Manoy. (2019). Representasi Siswa SMP dalam Memecahkan Masalah Matematika Ditinjau dari Kemampuan Matematika. *Jurnal Ilmiah Pendidikan Matematika*, *8*(3), 574–580.

Miles, et al. (2014). Qualitative Data Analysis. *SAGE Publication: International Educational and Professional Publisher*.

Norairi, et al. (2022). Representasi Siswa Sekolah Dasar dalam Pemecahan Soal Cerita Pecahan Ditinjau Berdasarkan Kemampuan Matematika dan Jenis Kelamin. *Jurnal Basicedu*, *6*(1), 1221–1231. https://doi.org/10.31004/basicedu.v6i1.2227

Rusminati and Styanada. (2020). Analisis Kemampuan Menyelesaikan Soal Bangun Ruang Berbasis HOTS Ditinjau dari Kemampuan Matematika Siswa SD. https://e-journal.my.id/jsgp/article/view/417

Sugiono. (2018). Representasi Matematis Siswa Dalam Menyelesaikan Soal Model PISA Matematika Ditinjau dari Perbedaan Jenis Kelamin. *Jurnal Ilmiah Pendidikan Matematika*, *7*(3). https://doi.org/10.26740/mathedunesa.v7n3.p619-623

Tajudin and Chinappan. (2016). The Link Between Higher Order Thinking Skills, Representation and Concepts in Enhancing TIMSS Tasks. *International Journal of Instruction*, *9*(2), 199–214. https://doi.org/10.12973/iji.2016.9214a