Mathematics Education Journals
Vol. 6 No. 2 August 2022

ISSN : 2579-5724
ISSN : 2579-5260 (Online)
http://ejournal.umm.ac.id/index.php/MEJ

Profile of Students' Creative Thinking in Solving Mathematical Problems in terms of Gender

Kharisma Isrozia Kusumawardhany[1], Mega Teguh Budiarto[2], Raden Sulaiman[3]

[1] Programme on Pasca Education Mathematics, State University of Surabaya,
[2,3] Mathematics Department, State University of Surabaya
Email :isroziakharisma@gmail.com

Abstract

Creative thinking is a person's mental activity related to sensitivity to problems, considering new information and unusual ideas with an open mind, generating alternative answers, and fulfilling the components of fluency, flexibility, and novelty. So far, gender differences have been referred to as one of the factors that affect students' creative thinking skills in solving problems. The purpose of this study was to describe students' creative thinking in solving math problems in terms of gender. This research is a qualitative descriptive study. The subjects of this study were 2 junior high school students in grade VII, where one student was male and one female student. The instrument in this study was a test of mathematical ability, problem-solving assignments, and interview guidelines. This study began by determining the research subject using a mathematical ability test then the researcher gave problem-solving tasks and interviews to each subject. The results obtained are a description of the creative thinking of male students and a description of the creative thinking of female students in solving math problems.

Keywords: Creative Thinking; Math Problems; Problem Solving; Gender

INTRODUCTION

In the application of education in Indonesia, one of the subjects taught in schools is mathematics. Learning mathematics certainly cannot be separated from problems because the success or failure of a person in learning can be seen from the ability to solve a problem. The problem itself is a question or problem that indicates a challenge, is not easy to solve using known procedures, and requires proper planning in the completion process first. So that math problems can be solved.

Problem-solving skills depend on the level of difficulty encountered. Krulick and Rudnick (1988) stated, "*problem-solving is how an individual uses previously acquired knowledge, skills, and understanding to satisfy the demands of an unfamiliar situation*" (p.4). Problem-solving is a method that individuals use before acquiring knowledge, skills, and understanding to meet the demands of unfamiliar situations. In other words, before acquiring knowledge, skills, and understanding, students can use problem-solving to explore knowledge, gain skills and understand the situation in question. A person's experience can be used as a tool to solve problems.

According to Sari (2017), in his research, found that teachers did not give students freedom in solving math problems and teachers only gave one definite

ISSN : 2579-5724
ISSN : 2579-5260 (Online)
http://ejournal.umm.ac.id/index.php/MEJ

answer, so students were not trained in creative thinking. Talking about creative thinking is certainly not an easy thing to fulfill. Siswono (2018) states that creative thinking is a series of actions taken to create new ideas from memories containing various conceptual thoughts, experiences, and knowledge. This understanding shows that the characteristic of creative thinking is to create something new from the results of various ideas, concept information, experience, and knowledge that is in the mind. Silver (Siswono, 2018: 33) stated that to measure the creative thinking ability of children and adults used "The Torrace Test of Creative Thinking (TTCT)." Essential indicators in measuring a person's creative thinking ability include fluency, flexibility, and novelty. One of the factors of students' creative thinking in solving math problems is sex. Sex in this study was male and female.

Based on some of the descriptions that have been described above, to find out how far the creative thinking skills are of male and female students in solving math problems. Therefore, researchers are interested in conducting research to describe the profile of students' creative thinking in solving math problems regarding gender.

RESEARCH METHOD

Based on the objectives to be achieved, this research includes qualitative descriptive research that produces descriptive data, where the data obtained are written or spoken words. This research concerns the creative thinking of students with high mathematical abilities in solving mathematical problems based on sex. The sample in this study was 20 students of class VII SMP Al Falah Surabaya, which consisted of 8 male students and 12 female students. Students are given a Mathematical Ability Test (TKM) to see if students abilities are equivalent. Two volunteer students with high mathematical ability were selected as research subjects and given a Problem Solving Task (TPM). Task-based interviews were conducted individually to explore students' creative thinking profiles.

To identify the profile of students' creative thinking in solving mathematical problems, the indicators of creative thinking are used in table 1.

Table 1. Activities and indicator Creative Thinking to Solve Problems

Krulik and Rudnick Stages	Creative Thinking Criteria	Indicators you want to know
Read and Explore	Fluency	Students can understand the problem smoothly about what is known and asked.
	Flexibility	Students use several alternatives in collecting data from the problems given.
	Novelty	Students use their own alternative language and are different from other friends in explaining the problems.
Select a Strategy	Fluency	Students think of ideas for solving problems directly or spontaneously.
	Flexibility	Students think of several problem-solving ideas smoothly.

ISSN : 2579-5724
ISSN : 2579-5260 (Online)
http://ejournal.umm.ac.id/index.php/MEJ

	Novelty	Students think of unique or different ideas in choosing problem-solving strategies.
Solve the Problem	Fluency	Students solve problems smoothly and correctly by writing down the steps for solving them.
	Flexibility	Students solve problems with various problem-solving ideas correctly.
	Novelty	Students solve problems with unique ideas (different from other friends) correctly.
Review and Extend	Fluency	Students review the results of problem-solving smoothly.
	Flexibility	Students review the results of solving problems with several ways of solving them smoothly.
	Novelty	Students review the results of problem-solving in a way that is unique or different from usual.

RESULTS AND DISCUSSION

A total of 20 students have taken the math ability test and have been successfully analyzed and presented in table 2 as follows:

Table 2. Results of Class VII Mathematics Ability Test (TKM) at SMP Al Falah Surabaya

No	Name	Sex	TKM Score	Category
1	APMS	PR	40	Low
2	NPA	PR	30	Low
3	RTB	PR	50	Low
4	SY	LK	45	Low
5	ARTP	PR	74	Currently
6	DMON	PR	72	Currently
7	HZAL	PR	70	Currently
8	KGYW	PR	65	Currently
9	NAHA	PR	70	Currently
10	AY	LK	74	Currently
11	EKA	LK	60	Currently
12	FSI	LK	70	Currently
13	RJH	LK	72	Currently
14	AAS	PR	88	Tall
15	CAI	PR	95	Tall
16	IQN	PR	85	Tall
17	IKI	PR	90	Tall
18	US	LK	94	Tall
19	DAP	LK	86	Tall
20	SMEs	LK	89	Tall

ISSN : 2579-5724
ISSN : 2579-5260 (Online)
http://ejournal.umm.ac.id/index.php/MEJ

Based on the data obtained by the researchers above, the subjects who met the criteria were students with the initials CAI with female sex and AS with male, and both subjects had the same TKM score. the difference in the scores of the two acquisitions is less than 10. This difference is quite small, so it can be considered that their mathematical abilities are equal. Furthermore, the selected students can also communicate well and are willing to be interviewed. So based on the selection series of class VII subjects above, two research subjects were obtained, namely: subject with initials AS and subject with initials CAI.

Data collection is done by giving Problem Solving Tasks (TPM) and interviews, it can be seen that problem solving related to number material with male and female sex is as follows.

1. Profile of Male Students' Creative Thinking in Solving Math Problems

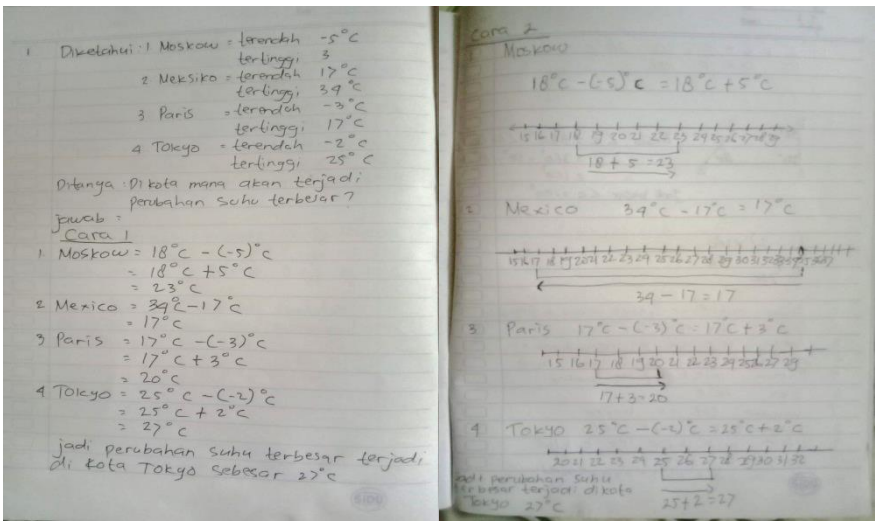

Figure 1. Results of Problem Solving Task 1 (TPM 1)
Male Subject

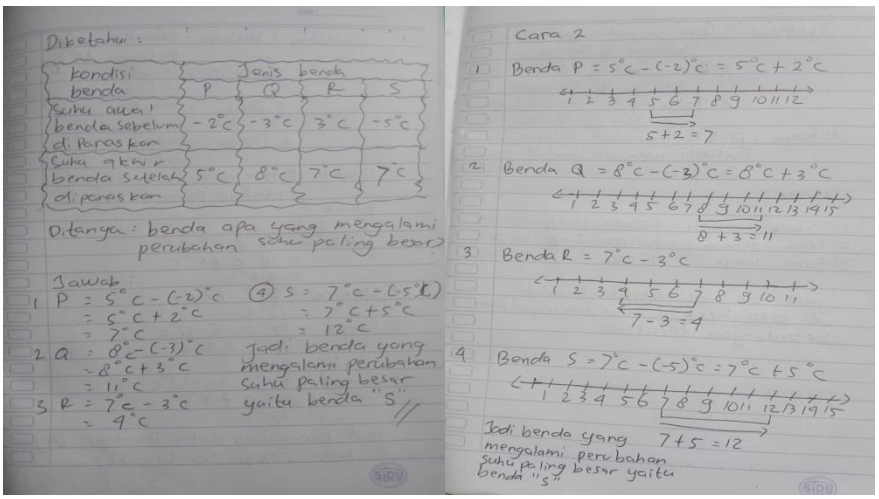

Figure 2. Results of Problem Solving Task 2 (TPM 2)
Male Subject

ISSN : 2579-5724
ISSN : 2579-5260 (Online)
http://ejournal.umm.ac.id/index.php/MEJ

Male subjects in solving mathematical problems use the stages of problem-solving in sequence. In the stage of reading and exploring, male subjects find essential elements in the problem, including elements that are known and asked. After knowing what was asked in the question, the subject also knew and explained orally that each element in the information that was known and asked had a relationship.

In the stage of selecting a strategy and the stage of solving the problem, male subjects know the various ideas used in solving TPM and can explain well why using the idea so that it meets the flexibility indicator. Furthermore, the subject presented various strategies to solve the problem, namely by combining the rules of subtraction with the multiplication of integers and using a number line. After knowing the ideas and strategies used, the subject implements the ideas and strategies in solving the TPM problem to show that the subject meets the fluency and novelty indicators. Because the subject meets all three indicators of creative thinking,

In the stage of review and extension, the subject verbally said that the problem-solving was done correctly by checking the answers. The strategy used in checking the answers with the operation rules for counting integers is to see the results of changes in the temperature of each city and make a number line so that, in this case, it meets the indicators of flexibility and fluency.

2. Profile of Female Students' Creative Thinking in Solving Math Problems

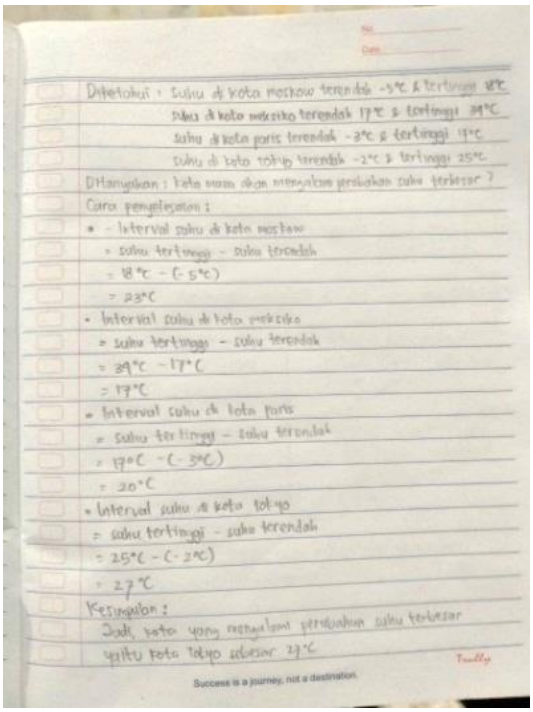

Figure 3. Results of Problem Solving Task 1 (TPM 1)
Female Subject

ISSN : 2579-5724
ISSN : 2579-5260 (Online)
http://ejournal.umm.ac.id/index.php/MEJ

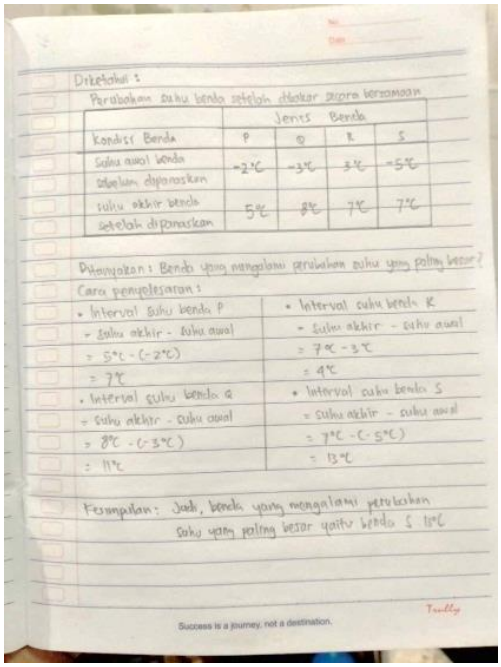

Figure 4. Results of Problem Solving Task 2 (TPM 2)
Female Subject

In examining the profile of students' creative thinking, female subjects in solving mathematical problems using the stages of problem-solving in sequence. At the stage of reading and exploring, female subjects can find important elements in the problem, including elements that are known and asked. It can be seen that the female subject wrote down the required information, and the subject could explain it orally well. After knowing and explaining orally what information was known and asked in the question, the subject also knew and explained each element in the information that was known and asked had a relationship.

Furthermore, in the stage of selecting a strategy and the stage of solving the problem, female subjects know one idea used in solving TPM and can explain well the reasons why using that idea. The subject suggests a strategy to solve the problem, namely by combining the rules of subtraction with the multiplication of integers, which fulfills the indicator of novelty. After knowing the ideas and strategies used, the subject implements these ideas and strategies in solving TPM problems. But the calculation of female subjects is less thorough, so there is an error in determining the results.

At the stage of review and extension, the subject verbally said that the problem-solving that was carried out was correct even though there were errors in the results due to the subject's lack of accuracy. The female subject checks the answers on her work by following the flow of solving the problem or recalculating the results found from the initial steps of her work to make sure the answer is correct. The strategy used in checking the answers with the operation rules for counting integers

ISSN : 2579-5724
ISSN : 2579-5260 (Online)
http://ejournal.umm.ac.id/index.php/MEJ

CONCLUSION

Based on the study results, we conclude that there is no significant difference between the creative thinking profile of male students and female students with high mathematical abilities in solving mathematical problems. The difference is found when choosing a strategy, solving problems, and reviewing the results of problem-solving. At the stage of choosing strategies and solving problems, male subjects know the various ideas used in solving TPM and can explain well the reasons why they use these ideas and in contrast to female subjects who only know one idea used in solving TPM but can explain it well. reasons why use the idea. Furthermore, male subjects put forward a variety of strategies used in solving problems, namely by combining the rules of subtraction with the multiplication of integers and using a number line, while female subjects suggested a strategy used in solving problems, namely by combining the rules of subtraction with the multiplication of integers only. After knowing the ideas and strategies used, male and female subjects implemented these ideas and strategies in solving TPM problems. Furthermore, in reviewing the results of problem-solving, there are significant differences in checking the correct or incorrect answers they are working on. The male subject, while the female subject, suggested a strategy used in solving the problem, namely by combining the rules of subtraction with the multiplication of integers only. After knowing the ideas and strategies used, male and female subjects implemented these ideas and strategies in solving TPM problems.

Furthermore, in reviewing the results of problem-solving, there are significant differences in checking the correct or incorrect answers they are working on male subject, while the female subject suggested a strategy used in solving the problem, namely by combining the rules of subtraction with the multiplication of integers only. After knowing the ideas and strategies used, male and female subjects implemented these ideas and strategies in solving TPM problems. Furthermore, in reviewing the results of problem-solving, there are significant differences in checking the correct or incorrect answers they are working on. male subject Furthermore, in the stage of reviewing the results of problem-solving, there are significant differences in checking the correct or incorrect answers they are working on. male subject Furthermore, in the stage of reviewing the results of problem-solving, there are significant differences in checking the correct or incorrect answers they are working on. male subjects operation rules for counting integers in checking for errors in their work. After the male subjects got the results of the temperature changes in each city, the subjects made a number line to sort the temperature changes from the smallest to the largest. Meanwhile, female subjects checked for errors in their work by following the flow of problem-solving from the initial steps of their work to making sure the answers were correct. Based on the explanation that has been stated, there are several similarities and differences between male and female subjects. However, the researcher concludes that the creative thinking profile of male students is superior to female students in solving math problems.

ISSN : 2579-5724
ISSN : 2579-5260 (Online)
http://ejournal.umm.ac.id/index.php/MEJ

REFERENCES

Aminah, S., & Abdul, J. (2018). *Gender dalam Perspektif Budaya dan Bahasa*. Jurnal Al-Maiyyah. 11(2): 170.

Andiyana, M. A., Maya. R., & Hidayat, W. (2018). *Analisis Kemampuan Berpikir Kreatif Matematika Siswa SMP Pada Materi Bangun Ruang*. JPMI (Jurnal Pembelajaran Matematika Inovatif), (Daring), Vol.1(3): 239-248.

Artaria, M. D. (2016). *Dasar Biologis Variasi Jenis Kelamin, Gender, dan Orientasi Seksual*. Jurnal Biokultur, 5(1), 157–165.

Astuti, R. & Aziz, T. (2019). *Integrasi Pengembangan Kreativitas Anak Usia Dini di TK Kanisius Sorowajan Yogyakarta*. Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini. Volume 3 Issue 2 (2019) Pages 294-302.

Benbow, C. P., & Stanley, I. C. (1980). *Sex Differences in Mathematical Ability: Fact or Artifact?*. Science. 210, 1262-1264.

Bernadi, R. (2017). *Peningkatan Kreativitas Siswa Kelas IV SD melalui Pembelajaran Tematik Integratif dengan Pendekatan Open-Ended*. Jurnal Prima Edukasia, 5(1), 91-101.

Butts, Thomas. (1980). *Posing Problem Property, Problem Solving in School Mathematics*. Reston, VA: NCTM.

Campbell, N. A., J. B. Reece, dan L. G. Mitchell. (2017). *Biology Eleventh Edition*. California: Pearson Education Inc.

Depdikbud. (2014). *Peraturan Menteri Pendidikan dan Kebudayaan, Nomor 58, Tahun 2014, tentang Kurikulum 2013 Sekolah Menengah Pertama (SMP) / Madrasah Tsanawiyah (MTs)*. Diunduh dari https://kelembagaan. ristekdikti.go.id/wp-content/upload/2016/08/UU no 20 th 2003.pdf pada 20 Juli 2020.

Depdiknas. (2003). *Undang-undang RI No.20 tahun 2003 tentang Sistem Pendidikan Nasional*. Diunduh dari https://kelembagaan.ristekdikti. go.id/wpcontent/upload /2016/08/UU no 20 th 2003.pdf pada 20 Juli 2020.

Farida, L. (2018). *The Influence Of Application Argument Driven Inquiry Model To Junior High School Studen't Argumenttion Skills Based On Difference Of Gender*. Journal of Physics and Science Learning, 2(3), 25–36.

Febryana, Devi. (2018). *Profil Kreativitas Siswa dalam Menyelesaikan Soal Segitiga dan Segiempat Ditinjau dari Gender*. Journal: Mathematics Education, Vol.4 No.1.

Firmanti, P. (2017). *Penalaran Siswa Laki-Laki dan Perempuan Dalam Proses Pembelajaran Matematika*. Journal of Gender Studies, 2(1), 73–85.

Hassoubah, Zaleha Izhab. (2008). *Mengasah Pikiran Kreatif dan Kritis*. Nuansa: Bandung.

Huda, M. (2017). *Model-model Pengajaran dan Pembelajaran*. Yogyakarta: Pustaka Pelajar.

Hudojo, H. (2005). *Pengembangan Kurikulum dan Pembelajaran Matematika*. Malang: UM Press.

Krulik, S., & Rudnick, J. A. (1988). *Problem Solving: A Handbook for Elementary School teachers*. Boston, MA: Allyn and Bacon, Inc.

Krulik, S., Rudnik, J., & Milou, E (2003). *Teaching mathematics in middle schools. A practical guide*. Boston:Pearson Education Inc.

ISSN : 2579-5724
ISSN : 2579-5260 (Online)
http://ejournal.umm.ac.id/index.php/MEJ

Munandar, Utami. (2012). *Pengembangan Kreativitas Anak Berbakat*. Jakarta: Rineca Cipta.

Novianti, F., & Yunianta, T.N.H. (2018). *Analisis Kemampuan Berpikir Kreatif Siswa SMP dalam Menyelesaikan Soal Matematika pada Materi Bentuk Aljabar yang Ditinjau dari Perbedaan Gender*. Mayu. 5(1): 120-132.

Nur, A. S., & Palabo, M. (2018). *Profil Kemampuan Pemecahan Masalah Matematika Siswa Ditinjau dari Perbedaan Gaya Kognitif dan Gender*. Jurnal Matematika Kreatif-Inovatif, 9(2), 139–148.

Parantika, I. W. A. (2020). *Differences in Academic Procrastination Attitude Between Fifth Grade Male and Female Students*. Journal of Psychology and Instruction, 4(1), 10–15.

Polya, G. (2004). *How to solve it: A New Aspect of Mathematical Method*. Princeton, NJ: Princeton University Press.

Santrock, J. W. (2009). *Remaja*. Jakarta: Erlangga.

Siswono. T.Y.E. (2018). *Pembelajaran Matematika Berbasis Pengajuan dan Pemecahan Masalah Fokus dapa Berpikir Kritis dan Berpikir Kreatif*. Bandung: PT Remaja Rosdakarya.

Solso, R. L., Maclin, O. H., & Maclin, M. K. (2014). *Cognitive Psychology*, 8th Ed. Essex: Pearson Education Limited.

Stanic & Kilpatrick. (1988). *Historical Perspective on Problem Solving in Mathematics Curriculum*. Diunduh dari https://tlsilveus.com/Portofolio/Documents/EDC1327 _ProblemSolving. pada 18 September 2020.

Steinthorsdottir, O. B., & Sriraman, B. (2007). *Gender and Strategy Use in Proportional Situations: an Icelandic Study*. Nordic Studies in Mathematics Education, 12 (3), 25-26. DOI:10.1.1.485.1625.

Sugiyono. (2017). *Metode Penelitian Kuantitatif, Kualitatif dan R&D*. Bandung: Alfabeta.

Suharna, H. (2018). *Teori Berpikir Reflektif*. Yogyakarta: Depublish.

Sumarmo, U., Hidayat, W., Zukarnaen, R., Hamidah, M., & Sariningsih, R. (2012). *Kemampuan dan Disposisi Berpikir Logis, Kritis, dan Kreatif Matematik (Eksperimen terhadap Siswa SMA Menggunakan Pembelajaran Berbasis Masalah dan Strategi Think-Talk-Write)*. Jurnal Pengajaran MIPA, 17(1), 17-33.

Surya, Muhamad. (2015). *Strategi Kognitif dalam Proses Pembelajaran*. Bandung: Alfabeta.

West, C., & Zimmerman. (2007). *Doing Gender*. Gender and Society, Vol.1 No.2.

Zheng Zhu. (2007). *Gender Differences in Mathematical Problem Solving Patterns: A Riview of Litterature*. International Education Jornal, 8 (2), 187-203.