The Students' Creative Thinking Skills on Literacy Numeracy Concepts

Lasia Agustina*, Zaenuri Zaenuri, Isnarto Isnarto, Dwijanto Dwijanto

Universitas Negeri Semarang, Indonesia
*Corresponding Author: lasiaagustina@students.unnes.ac.id

Abstract. The 21st-century citizens should have creative thinking skills with literature problems. This thinking has three components: novelty, flexibility, and fluency. This research aims to determine how the students' creative thinking skills through questions with numeric literacy concepts. This research is descriptive qualitative research with the triangulated data. The subjects were the students of the University of Indraprastha PGRI, Southern Jakarta. After taking the test, the researchers categorized the creative thinking skills into creative, average, and not creative categories. The results showed a new component supported the students' creative thinking skills about the numeric literacy concept. It was the communication. Previous studies showed four components to measure individuals' creative thinking skills on the numeric literacy concepts. They were communication, novelty, flexibility, and fluency. This research concluded that the student's creative thinking skills on the numerical literacy concept questions would be more observable if the communication component existed.

Key words: creative thinking; literacy; numeracy

How to Cite: Agustina, L., Zaenuri, Z., Isnarto, I., Dwijanto, D. (2021). The Students' Creative Thinking Skills on Literacy Numeracy Concepts. *ISET: International Conference on Science, Education and Technology, 7*(1), 979-987.

INTRODUCTION

"Literacy for All" is a jargon of the United Nation Educational, Scientific, and Cultural Organization (UNESCO) — an International education organization. This jargon emphasizes the human rights to be literate and to have preparation to live on. Literacy makes individuals, families, and community could improve their life qualities. Furthermore, literacy has a multiplier effect. It eradicates poverty, child mortality rate, and uncontrolled population number. Being literate facilitates reach the of gender equality and guarantees sustainable development, peace, and democracy (Mahdiansyah & Rahmawati, 2014). Being literate, especially for mathematics, as stated in the assessment framework draft of PISA 2012, is defined as an individual's skills to formulate, apply, and interpret mathematics in various contexts. It includes the mathematics reasoning skill and the applications of concepts, procedures, facts, and mathematics tools to describe, explain, and estimate phenomena or events(Buyung & Dwijanto, 2017).

The required mathematics skill to solve daily life problems is mathematics literacy. It has a crucial role to facilitate the mathematics use understanding in daily life. It helps individuals to reason, apply, and solve problems in various contexts of the real world. Literacy does not deal with reading skill measurement but it deals with reading texts.

The word literacy is derived from Latin, littera, or letter in English. It refers to a written system task involvement and the entailing conventions. However, literacy mainly deals with language and how it is used. On the other hand, the written language system has secondary nature. Language use and development cannot be separated from culture. Thus, the definition of literacy should cover the language elements, such as socio-culture(Mahdiansyah & Rahmawati, 2014). Mathematics literacy is defined as an individual's skill to formulate, apply, and interpret mathematics in various contexts. It includes the way to think mathematically, use the concepts, use the procedure, and utilize the facts to describe, explain, and estimate certain phenomena or events(Kuswidi, 2015). Mathematics literacy holds an important role in life reliability. It is a basic skill and is equally important with letter literate. The underlying principle of being literate is belief. The student should believe that the objectives of all teachers and each content facilitates them to read and write based on their expertise(Draper & Siebert, 2004). Low reading literacy has something to do with learning inaccuracy while estimating the measurements or portions. Therefore, it requires many studies to understand the literacy roles of each education level(Huizinga et al., 2009). Thus, mathematics learning at school should aim to develop mathematics literacy and to improve the students' skills to use and apply their mathematics knowledge and to solve problems in a real-life

situation(Sumirattana et al., 2017). Mathematics literacy is important knowledge to understand the basic mathematics application in daily life(Nitasari et al., 2018). This literacy facilitates an individual to understand the regulation that makes mathematics the reference to real life. It also facilitates them to create judgment and make the required decision to construct, use, and reflect an individual as a member of a community(Kuswidyanarko et al., 2017).

The mathematics literacy definitions based on the PISA's assessment framework draft, are(Sumirattana et al., 2017):

Mathematical literacy is an individual's capacity to reason mathematically, formulate, employ and interpret mathematics to solve problems in various real-world contexts. It includes concepts, procedures, facts, and tools to describe, explain and predict phenomena. It helps individuals know the role that mathematics plays in the world and make the well-founded judgments and decisions needed by constructive, engaged, and reflective 21st Century citizens.

OECD (Organization for Economic Co-operation and Development)(Echazarra & Schwabe, 2019) provides the mathematics literacy scopes as an individual's skills to identify and understand the mathematics role in life, to make an excellent decision, to use and participate with mathematics with the individual's life preference as a constructive, care, and reflective citizen. The limitations have the identification, understanding, making a decision, and mathematics empowering aspects in life. Thus, the aspects bring usefulness with the mathematics skill. The next scope deals with the individual existence as the part of global citizens. The definition is useful for the surrounding environment.

Sumber: https://pisa2021-maths.oecd.org/

Figure 1. The Mathematics Literacy Implementation Model

Figure 1 shows the correlation of mathematical reasoning with mathematics problem solving and typical mathematics literacy. The PISA's assessment in 2012 reported the process categories, such as formulating, employing, and interpreting. The figure shows eight required skills in the 21st century. They are critical thinking, creativity, research and investigation, self-directness, initiation and determination, information use, thinking system, and communication and reflection.

Creativity does not only deal with product production but creative thinking. It includes mathematics creative thinking(Wahyudi et al., 2019). The creative thinking process is important in mathematics learning especially in mathematics creative thinking skills(Maftukhah et al., 2017). Mathematics creativity refers to a cognitive action of the recognized concepts by labeling. It is to improve or broaden the students' understanding of the correctness of mathematics. Mathematics creativity improves if the teacher creates longer classroom dialog and opened situations in inter-disciplinary learning(Willemsen et al., 2019). Defines mathematics creativity as(Fatah et al., 2016):

1. The skill to produce a significant and original work to broaden physics science. It includes the synthesis and significant expansions of the recognized ideas.
2. The skill to open the path for new questions from the other mathematics experts.
3. The process of a specific solution and/or insight about certain problems or problem

analogy.

4. The question formulation and/or possible novelty that allows older problem considerations from new perspectives.

The creative thinking skill is an individual's skill to create something new both different ideas or works compared to the previous ones. Creative thinking skills should be developed while learning mathematics at higher education institutions(Murni et al., 2020). Mathematics creative thinking skill is important to solve complex problems(Ambar, 2019). It refers to a logical and divergent thought combination based on intuition but it has the realized objectives. Creative thinking skill deals with logical and intuitive thinking to create ideas for thinking creatively(Herayani et al., 2015). The process of logical thinking is useful to find the appropriate solution. Logical thought requires systematic and rational processes to verify and create valid conclusions. The divergent thought creates many ideas. It focuses on flexibility, fluency, and novelty for solving mathematics problems. Creative thinking is a combination of lateral and vertical thinking. They complement each other. Lateral thinking refers to finding a new thinking direction from the reasoning to find ideas. Vertical thinking deals with idea development and re-checking toward the objective criteria. Creative thinking skill development will be excellent if an evaluation could determine the learning development and become the evaluative materials(Kusuma et al., 2019). The students' creativity does not appear suddenly. Their creativity needs training and habituation(Permata et al., 2017). Generally, creative thinking is encouraged by challenging problems (Jaenudin et al., 2020). The students' creative thinking incapability toward what they had learned caused lower skills to solve mathematics questions(Saironi & Sukestiyarno, 2017).

The three measured components of creative thinking skills are fluency, flexibility, and novelty. Every individual's creative thinking is based on different thoughts and not dependent on each other. Students have the various background and different skills. They have different potentials in thinking, imagining, having fantasy, and expressing. Therefore, students have different thinking skill levels. A student may perform all components or some of them while solving problems or posting problems. The highest position is a novelty. The next one is flexibility and then the lowest one is fluency. The novelty is the highest one because it is the main feature of creative thinking product assessment. Flexibility is the second position because it refers to idea production to solve tasks and their expressions and to correct something in certain ways. It is also to propose the solved problems in various ways. Fluency refers to an individual's skill to produce ideas based on tasks in a question(Siswono, 2010). The criteria of creative thinking skills: Students meet all three aspects: fluency, flexibility, and novelty. These students are categorized as creative. If the students only meet two aspects. They are categorized as average students. Then, students that do not meet all aspects, are categorized as not creative(Siswono, 2010).

Mathematics learning at the university level covers finding evidence of mathematics learning. Evidence is a set of logical arguments that explains the truth of a statement. The skill to find the evidence in mathematics covers the skills to arrange the evidence and validate the evidence. The skill to find the evidence should cover the skills to use the evidence, definition, entry, and theorem to prove the truth of mathematics statements. On the other hand, the skill to validate the evidence covers criticizing the evidence related to the proving type in mathematics(Mahendra et al., 2019). The teachers' competence and management to create the teaching-learning environment are two important matters. They are useful to improve the students' mathematics creative thinking skills. Only a creative teacher could encourage his students to be creative and develops their creative thinking skills optimally and correlated with the teaching methods. Supriadi (2014) found that mathematics creative thinking skills of primary school students on the flexibility aspect were categorized high. However, their fluency obtained the lowest score(Yuniarti et al., 2017). The students of mathematics education are prepared to be excellent teachers for primary and middle education levels. Thus, they must have the competence and skills to be professional teachers. Therefore, they must have excellent literacy and creative thinking skills. The course learning achievement of Algebra course has the purpose to make students understand the real numerical concept and the algebraic operation with the real numeric object. It aims to make students able to solve specific cases and apply the solution in daily life.

From the previous studies about creative thinking skills, the researchers conducted a study under the topic of "The Students' Creative

Thinking Skills on Literacy Concepts". It was based on the reviewed problems of how the students' skills were based on numerical literacy concept questions.

METHODS

The qualitative research site was at the University of Indraparta PGRI Jakarta. The subjects were the second-semester students of the mathematics education study program in the academic year 2020/2021. They were 24 students that joined the basic algebra course. Then, the researcher selected 4 participants randomly based on their creativity levels. In this research, the researchers reviewed the mathematics creative thinking skill descriptions comprehensively with the given indicators. They were fluency, flexibility, and novelty (Siswono, 2010) based on the seven basic competence of mathematics of PISA 2018. They are *Communication, Mathematising, Representation, Reasoning, and Argument, Devising Strategies for Solving Problems, Using Symbolic, Formal, and Technical Language and Operation, and Using Mathematical Tools*(OECD, 2021).This research used some instruments, such as documents (the test results of mathematics creative thinking test and interview guideline). The methods of collecting data were creative thinking tests and triangulation or a combination of interview, observation, and documentation. Four students participated as the research subjects. They worked on the given creative thinking skill test with the given indicators as shown in Table 2. This research measured the creative thinking skill based on the questions, the assessment standard to examine each indicator, and the remarks of the tested skills as shown below.

Table 1. The standard score of creative thinking skills

No.	Remarks	Scores
1	No answers	0
2	Inaccurate answers and explanations	1
3	Accurate answers with inaccurate explanation	2
4	Accurate answers and explanations	3

(Ahmad, 2020) modified

Table 2. The Basic Mathematics Competence based on PISA (*Fundamental Mathematical Capabilities*)

No.	The Basic Mathematics Competence	The achievements
1	Communication	• Students can communicate while reading, explaining, and interpreting questions, statements, tasks, or objects. • Students can create a mental model of a situation in an attempt to understand, clarify, and formulate problems.
2	Mathematizing	• Students transform the real problems into mathematics forms (creating the structures, conceptualization, assumption, model formulation, interpretation, or judgment of mathematics result or model with its correlation to the initial problems)
3	Representation	• Students can select, interpret, translate, and use various representations in understanding situations while interacting with problems or stating the work results, such as graphics, tables, diagrams, figures, equations, formulas, and concrete objects.
4	Reasoning and Argument	• Students can think logically, explore, and connect the parts of the problems to create a conclusion, check the given answers, revise the report, and obtain a solution.
5	Students can devise strategies to solve problems.	• Students can use a set of the critical control process to recognize, formulate, and solve problems effectively. • Students can select or create plans or strategies of mathematics to solve problems from the tasks or contexts and monitor the promotion.
6	Students can use symbolic, formal, and technical language and operations.	• Students understand, interpret, manipulate, and create a symbolic expectation in mathematics context and mathematics operational expressions. • Students involve their understanding and the formal forms based on the definitions, regulations, formal systems, and the algorithm uses.
7	Students can use mathematical tools.	• Students can use and notice the weaknesses of the mathematics tools, such as the measuring tools, calculators, and computers to facilitate their mathematics activities.

RESULTS AND DISCUSSION

Subject 1 (S1)

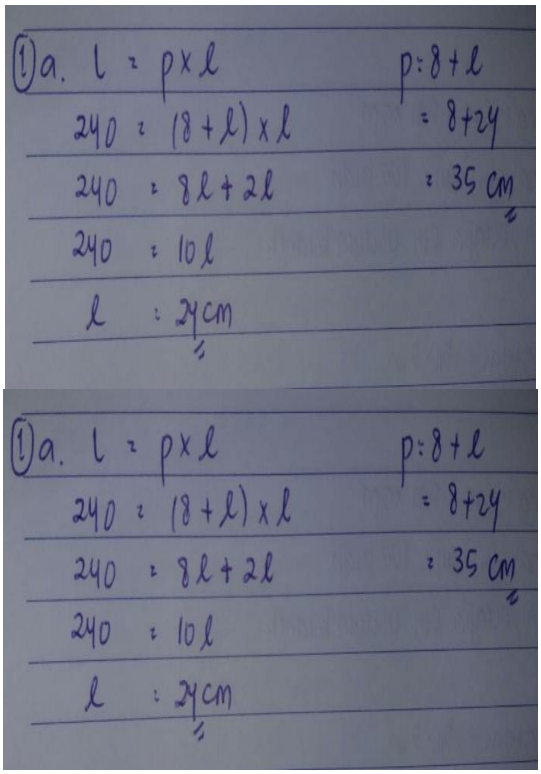

Figure 2. Answer S1

Here are the excerpts of the interview with S1
The researcher: "What did you first think while reading these questions?"
S1 : “What kind of question is it, madam? I took time reading it because I was confused about how to answer."
The researcher : "Did you ever find a similar question like this before?"
S1 : “I did when I was in JHS. It was easier than this tho.”
The researcher : “How many question points in the given question? Did you understand them all?”
S1 : “I could answer question 1 point a but I did not understand and could not answer the b and c point. Then, for the 1.d, I only knew one formula madam.”
The researcher : “What about the question item numbered 2?”
S1 : "I could work on the second question with points a and b although I only mentioned the forms for the b point. Unfortunately, for 2c, I was running out of time and I had no clear ideas the point of 2.d madam."

S1 argued that he could work on questions numbered 1 and 2 by applying his logic. At the first time, on the first question, he was confused to determine the stages or solution because he was unfamiliar with the question. He took time to re-read the question so that he understood the point to solve. S1 could work on the first question, point a, but the result was inaccurate. Then, he could answer the second question, point a, b, and d with a total score of 10. He met one component, fluency (to create ideas based on the task in a question). Thus, he was categorized as an average creative student. In this case, the basic mathematics competence of S1 covered mathematizing, representing, and formulating strategies to solve problems. Unfortunately, he could not meet the other competence.

Subject 2 (S2)

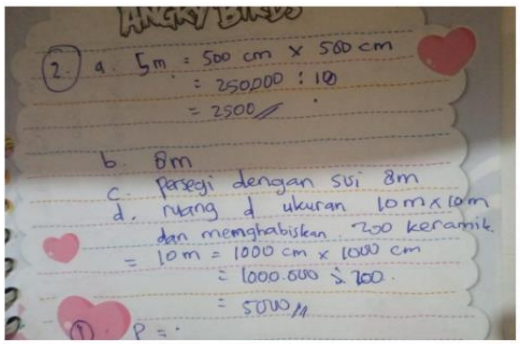

Figure 3. Answer S2

The interview excerpt with S2
The researcher : "What did you think while being given these questions?"
S2 : “I was confused madam”
The researcher : “How come? Was it due to the sentence or what?”
S2 : "I was shocked because of it plus my surrounding situation did not support me. So, could it be answered logically, madam?"
The researcher : “What hindered you to answer the questions?”
S2 : “My surrounding was so crowded so that I could not focus. Moreover, it had a time limitation to work on.”
The researcher : "Why did you directly answer the second question and left the number 1?"
S2 : “It was as I explained previously madam. I wanted to work on the first question but it was crowded. Then, when I wanted to answer the second question, the crowded sounds disappeared so I could focus.”
The researcher : “What difficulties made you could not focus?”
S2 : "I did not know what to answer and what formula to use so that I answered based on my logic madam."

From the interview, S2 could not work on the first question due to the non-conducive environmental factor. It was too crowded and noisy for him. His parents' blender sound made him could not focus to work on the first question. It was the reason he left it blank and continued with the second question. The subject could work on the second question, points a, b, c, and d. The 2.a question point was not complete. The 2.b question point had not to stage explanation. The 2.c question point had an inaccurate answer while the 2.d question point had an incorrect answer. The interview results showed that S2 had not understood the points of the question. However, he could answer based on his reasoning skills. His answers resembled what he thought at that moment. However, during the interview, he was aware of the questions and could answer appropriately and in a structured manner. The total score of his creative thinking test results was 6 with incorrect answers. Thus, he had not met any creative thinking skills so he was categorized as not creative. The other difficulties were a lack of understanding about the question and the educational background (S2 was graduated from social study major). Therefore, based on his work and the interview result, S2 only met the mathematization.

Subject 3 (S3)

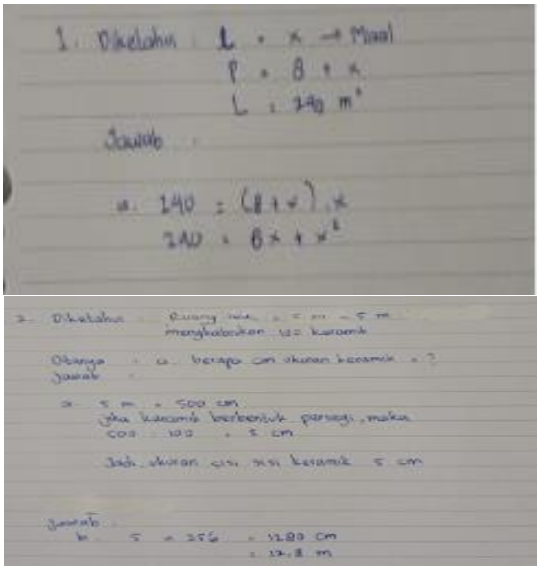

Figure 4. Answer S3

Here are the interview excerpts with subject 3 (S3)
The researcher : "What did you do when I shared this question?"
S3 : "I was panic, nervous, and confused about how to answer."
The researcher : "Was the question clear?"
S3 : "It was clear madam but I needed time reading it many times to make me understand and know what to do."
The researcher : "Why did not you completely answer the first question?"
S3 : "I spent time too much reading the question. It made me panic and running out of time."
The researcher : "Did you understand what was asked by the questions?"
S3 : "After reading the questions many times, it made me calm and, Insya Allah, I understood them, madam."
The researcher : "Did you think of a mathematics model solution to solve the questions?"
S3 : "I used my logic and previous knowledge that I recalled madam."

Based on the works and the interview, S3 could answer questions 1 and 2. However, he was panic and nervous at the first sight. He could determine the direction and use the proper concept to answer the 1.a point question. However, he stopped while writing the answer because he was confused. During the interview, he felt he could have worked on the first question. He admitted due to panic he could not continue it. Then, it made S3 continued to leave it and continued to the second question. S3 could represent the question in mathematics form. He could do it by finding out the given, the questioned, and the answer. However, while answering the 2.a and 2.b point questions, S3 had mistakes because he was panic and could not concentrate. S3 was a qualified student in the lesson. However, based on the test, S3 only met 4 components. Thus, his skill was only at the fluency level and categorized as averagely creative. In this case, the basic mathematics competence of S3 covered communicating, mathematizing, representing, and formulating strategies to solve problems. Unfortunately, he could not meet the other competence.

Subject 4 (S4)

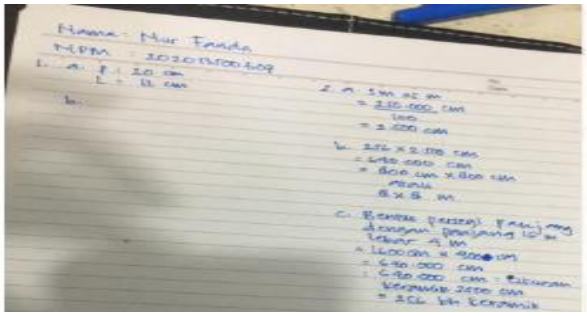

Figure 5. Answer S4

Here are the interview excerpts with subject 4 (S4)
The researcher : “What did you do when you read this question?”
S4 : ‘I was surprised because usually the question examples and the real questions were not quite different.”
The researcher : "Did you think of any solution to the questions?"
S4 : "I used my logic madam. I remembered the second question but for the first question I could not answer."
The researcher : “What was your applied method or model to solve the given questions?”
S4 : "I just tried to use my logic and reasons because I could not think any formula to answer."
The researcher : “What hindered you while solving these unfamiliar questions?”
S4 : "I had difficulties if the questions required me to create illustrations, madam. Thus, I had to guess the points of the questions. On the other hand, I usually found questions that directly asked the questions."

From the results, S4 was surprised and felt unfamiliar with the questions. He usually worked on questions that were similar in the lesson. S4 was unfamiliar to engage with the given question application. He could work on the first question based on his reasoning and logic. He answered correctly in the 1.a point question. However, he did it by guessing without any explanation on his stage. S4 was confused to find other answers in 1.b, 1.c, and 1.d point questions. Thus, he directly moved into question number 2. The researchers found he could answer the 2.a, 2.b, and 2.c point questions appropriately based on the expected concepts. He obtained a total score of 11 and met two creative thinking skill aspects. They were fluency and flexibility so he was categorized averagely creative. In this case, the basic mathematics competence of S4 covered communicating, mathematizing, representing, and formulating strategies to solve problems. On the other hand, S4 had mot net the other competencies.

Based on the documentation and interview, the research found three students with average creativity (meeting one of two components) and a student without creativity because he did not meet the creative thinking components. From the results, three students had difficulties understanding the point of the questions. It was because their literacy skills (the communication) were low. Thus, the students should master this communication so they could read the questions, graphics, figures, etc. Based on the previous studies, it is recommended to add an indicator, communication, to measure an individual’s creative thinking skills on numerical literacy concept questions. The reason is if an individual has excellent communication with the situation he encounters, his other creative thinking component will be better. Thus, the indicators or components of creative thinking on the questions should cover communication, novelty, flexibility, and fluency.

CONCLUSION

This research found four components to measure creative thinking skills with the numerical literacy concept questions. They were communication, novelty, flexibility, and fluency. Communication shows the individual's skill to process and manage information based on the given tasks. Novelty refers to the individual's skills to create new ideas. Flexibility refers to the individual's skills to produce several ideas. Fluency refers to the individual’s skill to produce ideas based on the tasks. Thus, the students' creative thinking skills with numerical literacy concept questions would be better if they had proper communication.

REFERENCES

Ahmad, D. N. (2020). Analisis Hasil Pembelajaran HOST Dalam Mengukur Kemampuan Berpikir Kreatif Pada Materi Kingdom Fungi. *SINASIS (Seminar Nasional Sains)*, *1*(1), 668–674.

Ambar, P. (2019). Mathematical creative thinking ability based on students’ characteristics of thinking style through selective problem solving learning model with ethnomatematics nuanced. *Unnes Journal of Mathematics Education*, *8*(1), 49–57. https://doi.org/10.15294/ujme.v8i1.29192

Buyung, & Dwijanto. (2017). Analisis Kemampuan Literasi Matematis melalui Pembelajaran Inkuiri dengan Strategi Scaffolding. *Unnes Journal of Mathematics Education Research*, *6*(1), 112–119.

Draper, R. J., & Siebert, D. (2004). Different Goals, Similar Practices: Making Sense of the Mathematics and Literacy Instruction in a. *American Educational Research Journal*, *41*(4), 927–962.

Echazarra, A., & Schwabe, M. (2019). PISA 2018 Results: Spain. *OECD 2019*, *I*. https:// www.oecd.org/pisa/publications/pisa-2018-

results.htm

Fatah, A., Suryadi, D., Sabandar, J., & Turmudi. (2016). Open-ended approach: An effort in cultivating students' mathematical creative thinking ability and self-esteem in mathematics. *Journal on Mathematics Education*, *7*(1), 9–18. https://doi.org/10.22342/jme.7.1.2813.9-18

Herayani, Kartono, & Sukestiyarno, Y. (2015). Analisis Berpikir Kreatif Matematis Dan Karakter Rasa Ingin Tahu Pada Pembelajaran Sscs Berbantuan Media Puzzle Materi Pecahan. *Journal of Primary Education*, *4*(2), 96–103. https://doi.org/10.15294/jpe.v4i2.10088

Huizinga, M. M., Carlisle, A. J., Cavanaugh, K. L., Davis, D. L., Gregory, R. P., Schlundt, D. G., & Rothman, R. L. (2009). Literacy, Numeracy, and Portion-Size Estimation Skills. *AMEPRE*, *36*(4), 324–328. https://doi.org/10.1016/j.amepre.2008.11.012

Jaenudin, A., Kartono, Sukestiyarno, Y. ., & Mariani, S. (2020). The Identification of Students' Mathematical Creative Thinking Ability on Transformation Geometry. *Social Science, Education and Humanities Research*, *443*(Iset 2019), 101–104. https://doi.org/10.2991/assehr.k.200620.020

Kusuma, D., Kartono, & Zaenuri. (2019). Creative Thinking Ability based on Students' Metacognition in Creative Problem Solving Learning Model With Recitation and Self-Assessment in Ethnomatematics. *Unnes Journal of Mathematics Education Research*, *8*(1), 25–34. http://journal.unnes.ac.id/sju/index.php/ujmer

Kuswidi, I. (2015). Brain-Based Learning Untuk Meningkatkan Literasi Matematis Siswa. *Al-Jabar : Jurnal Pendidikan Matematika*, *6*(2), 195–202. https://doi.org/10.24042/ajpm.v6i2.49

Kuswidyanarko, A., Wardono, & Isnarto. (2017). The Analysis of Mathematical Literacy on Realistic Problem-Based Learning with E-Edmodo Based on Student's Self Efficacy. *Journal of Primary Education*, *6*(2), 103–113. https://doi.org/10.15294/jpe.v6i2.17556

Maftukhah, N. A., Nurhalim, K., Dasar, P. P., & Semarang, U. N. (2017). Kemampuan Berpikir Kreatif dalam Pembelajaran Model Connecting Organizing Reflecting Extending Ditinjau dari Kecerdasan Emosional. *Journal of Primary Education*, *6*(3), 267–276. https://doi.org/10.15294/jpe.v6i3.21141

Mahdiansyah, & Rahmawati. (2014). Literasi Matematika Siswa Pendidikan Menengah: Analisis Menggunakan Desain Tes Internasional dengan Konteks Indonesia. *Jurnal Pendidikan Dan Kebudayaan*, *20*(4), 452. https://doi.org/10.24832/jpnk.v20i4.158

Mahendra, I. W. E., Erawati, N. K., & Sunita, N. W. (2019). Mental construction in mathematical proof. *Journal of Physics: Conference Series*, *1321*(2). https://doi.org/10.1088/1742-6596/1321/2/ 022135

Murni, S., Bernard, M., Ruqoyyah, S., & Chotimah, S. (2020). PGSD student's mathematical creative thinking skills judging from creativity quotations by making vba-based teaching. *Journal of Physics: Conference Series*, *1521*(3). https://doi.org/10.1088/1742-6596/1521/3/032040

Nitasari, A., Suyitno, H., & Isnarto. (2018). Analysis of Mathematical Literacy Ability on PjBL Model Assisted by Observation Independent Task. *Unnes Journal of Mathematics Education*, *7*(2), 129–136. https://doi.org/10.15294/ujme.v7i2.26462

OECD. (2021). Pisa 2021 Mathematics Framework (Draft). *PISA 2021 MATHEMATICS FRAMEWORK*, *November 2018*.

Permata, J. I., Sukestiyarno, Y. L., & Hindarto, N. (2017). Analisis Representasi Matematis Ditinjau dari Kreativitas dalam Pembelajaran Cps dengan Asesmen Diagnostik. *Unnes Journal of Mathematics Education Research*, *6*(2), 233–241.

Saironi, M., & Sukestiyarno, Y. (2017). Kemampuan Berpikir Kreatif Matematis Siswa dan Pembentukan Karakter Rasa Ingin Tahu Siswa pada Pembelajaran Open Ended Berbasis Etnomatematika. *Unnes Journal of Mathematics Educatio Research*, *6*(1), 76–88. http://journal.unnes.ac.id/sju/index.php/ujmer

Siswono, T. Y. E. (2010). Leveling Student's Creativity in Solving and Posing Matehematical Problem. *IndoMS. J.M.E*, *1*(1), 17–40.

Sumirattana, S., Makanong, A., & Thipkong, S. (2017). Kasetsart Journal of Social Sciences Using realistic mathematics education and the DAPIC problem-solving process to enhance secondary school students ' mathematical literacy. *Kasetsart Journal of Social Sciences*, *38*(3), 307–315. https://doi.org/10.1016/j.kjss.2016.06.001

Wahyudi, W., Waluya, S. B., Suyitno, H., & Isnarto,

I. (2019). The Use Of 3CM (Cool-Critical-Creative-Meaningful) Model In Blended Learning To Improve Creative Thinking Ability In Solving Mathematics Problem. *Journal of Educational Science and Technology (EST)*, *5*(1), 26. https://doi.org/10.26858/est.v5i1.7852

Willemsen, R. H., Schoevers, E. M., & Kroesbergen, E. H. (2019). The Structure of Creativity in Primary Education: An Empirical Confirmation of the Amusement Park Theory. *Journal of Creative Behavior*, *54*, 857–870. https://doi.org/10.1002/jocb.411

Yuniarti, Y., Kusumah, Y. S., Suryadi, D., & Bana, G. (2017). The Effectiveness of Open-Ended Problems Based Analytic-Synthetic Learning on the Mathematical Creative Thinking Ability of Pre-Service Elementary School Teachers. *International Electronic Journal of Mathematics Education (IEJME-Mathematic Education)*, *12*(7), 655–666.