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Exploring pre-service teachers' inquisitiveness in contradictory mathematics problems

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Abstract: This research aims to analyze the inquisitiveness of critical thinking students in solving mathematical problems with contradictory information. The subjects in this study were 26 students who completed the test with contradictory mathematics problems, and then 2 students who exhibited inquisitiveness were selected for interviews. The data collection instruments used were tests and interviews. The data analysis techniques employed included data reduction, data presentation, and drawing conclusions. The results of this research show that there are students who demonstrate inquisitiveness. This is evidenced by the results of the subjects' answers, which meet the indicators of inquisitiveness. Some indicators of inquisitiveness that were met include asking questions and seeking information to find alternative answers. It can be concluded that the inquisitiveness of prospective teacher students aligns with the indicators by asking questions. The originality of prospective teachers' inquisitiveness becomes particularly evident when they confront contradictory mathematics problems, as their ability to question assumptions and explore unconventional solutions is crucial for developing innovative teaching strategies and fostering a deep mathematical understanding.
Keywords: *Contradictiory mathematics problems, Inquisitiveness, Pre-service teachers.*

1. Introduction

Critical thinking disposition encompasses inquisitiveness as one of its key elements [1]. Inquisitiveness is part of curiosity [2]. Inquisitiveness manifests as an individual's intellectual curiosity, characterized by a persistent interest in matters of an intellectual nature [3]. It is exemplified by a person's habitual tendency to pose numerous questions in order to gather information [4]. Fundamentally, inquisitiveness describes a powerful internal motivation to pursue and obtain new knowledge.

A student needs to have inquisitiveness as an initial ability in critical thinking so as to be motivated and find the answer to a problem [5]. Students in learning mathematics today are often faced with problems that require critical thinking and strong curiosity to achieve deep understanding [6]. One of the characteristics that a person has a critical thinking disposition is showing high curiosity when exploring the right information [7]. Contradictory mathematics problems are one example that requires strong curiosity and critical thinking disposition [8]. Contradictory mathematics problems contain contradictory or inconsistent statements and often leave students feeling confused and find it difficult to find a consistent solution [9]. Students can get stuck in limited thinking and struggle to find alternative solutions [10]. Problem posing and solving activities can enrich learners' mathematical experience because they foster a spirit of curiosity [11].

Contradictory mathematical problems require a combination of high curiosity and strong critical thinking dispositions [12]. The skills of curiosity and critical thinking disposition are important in helping students overcome these challenges [13]. Curiosity encourages in-depth exploration and better understanding of the contradiction, while critical thinking disposition enables students to critically analyze, evaluate evidence, and seek consistent solutions [14].

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In the context of mathematics, curiosity encourages one to explore and understand mathematical concepts more deeply [15]. When faced with contradictory mathematical problems, curiosity plays an important role as it encourages us to seek a better understanding of the contradiction itself [16]. Curiosity motivates one to dig deeper and study contradictory phenomena [17]. When faced with a contradictory mathematical problem, a person with strong curiosity will ask critical questions, such as "Why is there a contradiction?", "Is there an error in the initial assumption or statement?", or "Is there a way to resolve this contradiction?". By asking and seeking answers to these questions, one can develop a better understanding of the nature of contradictions and find creative solutions [18].

Inquisitiveness not only improves students' problem-solving capabilities but also fosters the growth of mathematical resilience. Highly curious students are more inclined to persevere when confronted with difficult problems, driven by their eagerness to explore underlying principles and inconsistencies [19]. Furthermore, curious learners typically tackle problems with a receptive mindset, enabling them to explore various viewpoints and discover creative solutions [20]. This characteristic is especially valuable in mathematics education, where intricate problem-solving often demands adaptability and determination [21].

The development of curiosity and critical thinking disposition in solving contradictory mathematical problems has important implications in mathematics learning [22]. Students who have high curiosity and strong critical thinking disposition [23], will be better able to overcome obstacles and difficulties in understanding complex mathematical problems. They will be more skillful in identifying logical errors, exploring mathematical concepts more deeply, and looking for possible alternative solutions [24]. Therefore, research on the role of curiosity and critical thinking disposition in solving contradictory mathematical problems has significant relevance in improving students' mathematics learning [25].

Critical thinking plays a key role in solving contradictory mathematical problems [26]. The ability to carefully analyze, evaluate evidence, and question assumptions are important factors in solving these problems [27]. Students who have strong critical thinking skills will identify logical fallacies, look for weaknesses in contradictory arguments, and develop solutions that are consistent with a deep understanding of mathematics.

Furthermore, examining how pre-service teachers approach conflicting mathematical problems with curiosity can offer crucial insights for developing effective instructional methods. By cultivating a curious mindset, aspiring educators will be more capable of assisting their students in navigating complex problem-solving tasks, promoting critical thinking and perseverance in mathematical learning [28]. This research not only adds to the current knowledge base but also emphasizes the significance of fostering curiosity as an essential skill for both mathematics instruction and learning. The findings underscore the importance of nurturing inquisitiveness in future teachers to enhance their ability to guide students through challenging mathematical concepts and problem-solving processes.

2. Methods

2.1. Research Design

This research is qualitative research with the type of research is a case study. Case study research focuses on one particular object that is raised as a case to be studied in depth so as to reveal the reality behind the phenomenon [29]. The subjects in this study were 4th semester students at University in Madiun (Indonesia) who were taking the Elementary Mathematics Learning course. The subjects in this study were 26 students who completed the test with contradictory math problems for the purpose of presentation, two students were selected who had the most complete work and showed inquisitiveness.

Table 1.

No	Group Name	Amount	Gender	Age	Term	Grade-point average
1	A	8	F=5, M=3	19-20	3	3,55-3,85
2	B	9	F=6, M=3	20-21	5	3,35-3,50
3	C	9	F=4, M=5	21-22	7	3,60-3,80
Total		26	F=15, M=11	19-22	3-7	3,35-3,85

2.2. Data Collection

Data collection techniques in this study were test instruments and documentation. Tests are used to determine student inquisitiveness. The test in this study was in the form of problems with contradiction mathematics problems. The problem given is a mathematical problem of contradiction in geometry material. Data analysis techniques used are data reduction, data presentation, and conclusion drawing. Data reduction in this study was carried out continuously after research in the field, until the final report was completely compiled. Data reduction was analyzed in the form of written test results. The second is data presentation. Data presentation is in the form of clear descriptions, tables, and charts, making it easier for researchers to understand the research data. The third is conclusion drawing. Conclusions are in the form of research findings that are new or have never existed in previous research findings.

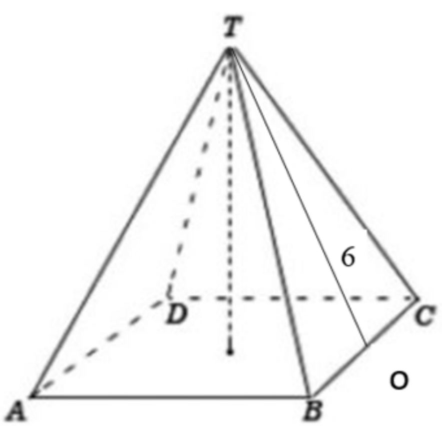
2.3. Data Analysis

In this study using method triangulation by comparing the consistency between the results of the work of contradiction math problems with interview transcripts. Triangulation of methods was carried out continuously during the data collection process on the research subject. The purpose of the triangulation in question is so that the data obtained is valid and consistent. The research procedures in this study are preparation, determining the problem, making research instruments, conducting research and analyzing data.

3. Results and Discussion

3.1. Results

The subjects in this study were 26 students who completed the test with contradictory math problems and then obtained 2 students who had inquisitiveness and then continued with interviews. The results of the answers to the test questions from the two subjects will be analyzed then continued with interviews. The test questions given are as follows:



Look at the following pyramid image! If the TABCD pyramid has a square base with a base side length of 8 centimeters, the height of the pyramid is 3 centimeters and the length of TO is 6 centimeters. Determine the surface area of the pyramid!

Figure 1.
Test questions with contradiction math problems.

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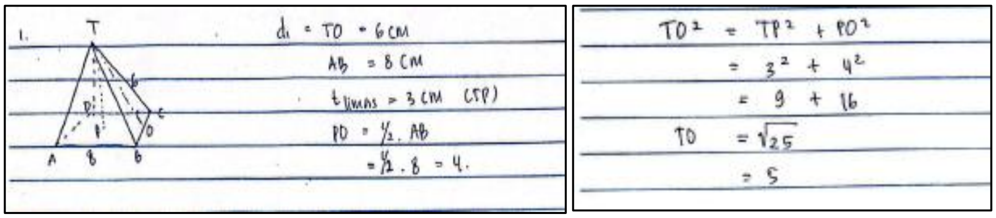
Translation:

Take a look at the pyramid picture below! If the pyramid TABCD has a square base with a length of 8 centimeters, the height of the pyramid is 3 centimeters and the length of TO is 6 centimeters. Determine the surface area of the pyramid!

The following will describe the answers of the two subjects. The first subject is called S1 and the second subject is called S2.



(a) (b)

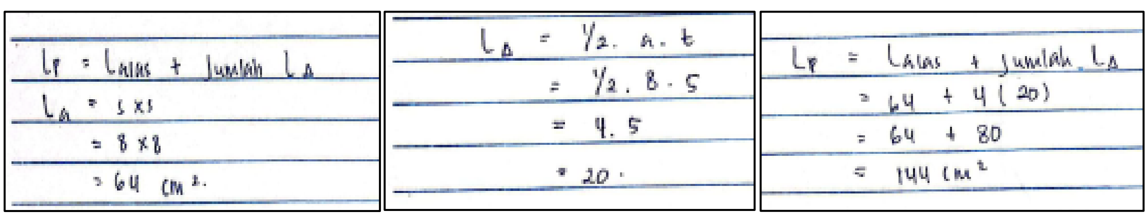
Figure 2.
Answer Question S1.

Translation:

Answer (a) draw a pyramid, diagonal 1 TO is 6 centimeters, AB is 8 centimeters, the height of the pyramid is 3 centimeters and the length of PO is half the length of AB which is 4 centimeters.

Answer (b) explains TO squared is the sum of TP squared and PO squared so that the result of TO is 5 centimeters.

Based on Figure 1.1 (a) S1 redrew the pyramid and wrote down the known information from the problem. The second step (b) S1 calculates the length of TO using the Phytagorean Theorem. S1 did not use the length of TO = 6 cm but searched with the phytagorean formula and obtained a result of 5 cm. on the answer sheet provides information by explaining the phytagorean theory.



(a) (b) (c)

Figure 3.
Final work result S1.

Translations:

Answer (a) The surface area is equal to the base area plus the triangle area. The area of the base is equal to the side squared which is 64 centimeters squared.

Answer (b) The area of a triangle is equal to half times the base times the height, which is 20 centimeters.

Answer (c) The surface area of the pyramid is equal to the sum of the area of the base of the pyramid with four times the triangle area calculated in point (a) and point (b). So the surface area is 144 centimeters squared.

Based on Figure 1.3, at point (a) S1 calculates the surface area of the pyramid by using the formula for the sum of the base area and the sum of the triangle areas. Then first find the base area using the 8 cm side. At point (b), S1 calculates one of the triangle areas. At point (c) then uses the formula the

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surface area of a pyramid is equal to the area of the base of the pyramid plus four times the area of the triangle.

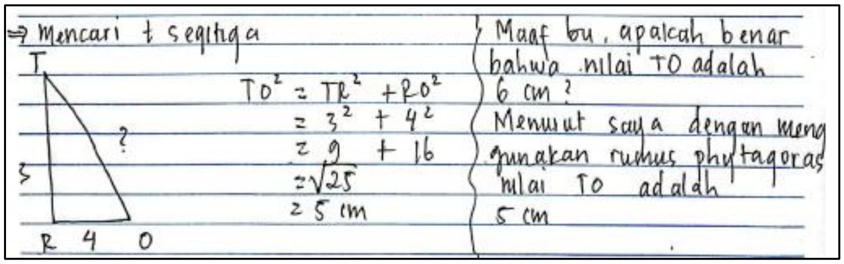

Figure 4.
Answer Question S2.

Translations:

Answer finds the height of the triangle by squaring to equal to TR squared added to RO squared so the result is 5 centimeters. The subject wrote the following question, sorry ma'am, is it true that the value of TO is 6 centimeters? because I think by using phytagoras, the value of TO is 5 centimeters.

Based on Figure 1.4, S2's answer shows that to find the height of TO, he did not use the information already known in the problem but instead looked for the height of TO by using the Phytagorean Theorem. The result obtained is the height of TO is 5 cm. On the answer sheet S2 found uniqueness by writing a note asking about the irregularity of the information in the problem. S2 then calculated the surface area of the pyramid using the TO height of 5 cm.

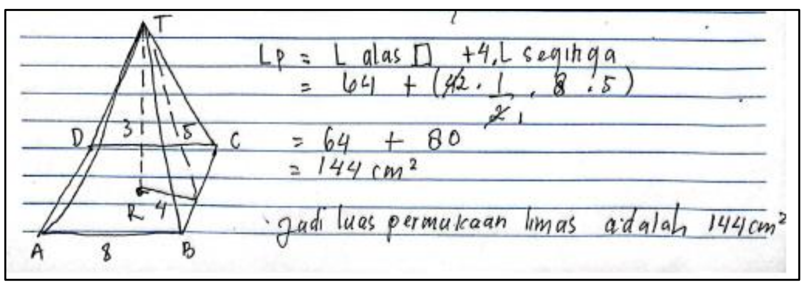

Figure 5.
Final work result S2.

Translations:

Answer LP (surface area) is equal to the area of a square plus four times the area of a triangle. So, the surface area of a pyramid is 144 centimeters.

Based on the answer in Figure 1.5, S2 calculates the surface area of the pyramid by using TO = 5 cm which is not in accordance with the information from the problem given. S2 ignores the incorrect information in the problem by continuing to work on the problem according to the theorem that is believed.

S1 and S2 after working on the problem given then continued with the interview. The interview was conducted by asking several questions related to the results of the answers that have been done. Excerpts of the interview with S1 will be explained as follows:

> P: How about the problem that you have done? Is the information contained in the problem clear?
> S1: Sorry ma'am, when I did the problem, when calculating the length of TO it was not the same as what was written in the problem.
> P: How does that mean? Can you explain?

S1: What is written in the problem is that the length of TO is 6 cm, while when I calculate it is 5 cm. Is it about the problem given there is an error or a typo, ma'am?
P: Why do you think that the problem given has a typo?
S1: Yes because of that ma'am, I counted 5 cm. So, I tried to ask a friend if there was a mistake, ma'am.
P: Try to explain first, how did you find 5 cm?
S1: I calculated the length of TO using the phytagorean formula, Mom, because TO is the hypotenuse of the upright triangle.
P: When you found 5 cm and you felt there was a typo, why didn't you ask me?
S1: Yes, I thought maybe there was a typo, so I ignored it ma'am. Finally, I calculated the surface area with a TO of 5 cm.

Based on the results of the interview excerpt with S1, it shows that S1 actually realized that there was inappropriate information. S1 has the belief that there is a mistake in the problem but ignores it. So S1 continues to work according to what he believes. Then during the interview just confirmed by asking about the information in the problem.

Furthermore, the interview excerpt with S2 will be explained as follows:
P: What about the problem you have done? Why did you write that note on your answer sheet?
S2: Well yes ma'am, actually I was confused ma'am, at first, I calculated based on the TO value that was listed. But then I checked again that TO is the hypotenuse.
P: Why didn't you ask me?
S2: I thought there was a typo, but there was no follow-up information from Mom. The point is that Ms. Fida doesn't revise if the question is wrong. That's why I wrote it in my notes like that, ma'am.
P: Why did you think that there was an error?
S2: Yes, because I checked again that TO is the hypotenuse of the triangle. That's why I did it by finding phytagoras.

Based on the results of the quote with S2, it shows that S2 realized that there was different information. S2 considered that the problem given had no revision, so at the beginning S2 worked according to the information listed. But after checking back, S2 felt that there was a mistake in calculating so S2 re-calculated according to what he believed.

4. Discussion

Based on the research results described, it shows that there are students who have inquisitiveness. This is indicated by the results of the subject's answers that fulfill the indicators of inquisitiveness. Some indicators of inquisitiveness that are fulfilled are by looking for information first as an attempt to find alternative answers [30]. In addition, there is a process when the subject asks questions by giving notes. Students who ask questions fulfill one of the indicators of inquisitiveness. Student inquisitiveness that appears will provide an impetus to seek information from the problems given [31]. This is in line with research from Santoso, et al. [32] that students who have critical thinking skills start from asking critical questions.

Some questions given during the interview showed that the subject was aware of the information that did not match [33]. The problem-solving process shows that students make sure by looking for information contained in the problem. Information seeking is one of the steps in the critical thinking process [34]. Students with inquisitiveness will often ask questions as a process of seeking information (Fusaro & Smith, 2018). The questions asked will be a strategy in finding answers [35]. This proves that the student has inquisitiveness [36].

Inquisitiveness can encourage one to seek a deep understanding of the mathematical problem [37]. By continuing to question and investigate, inquisitive thinkers can develop better insights into the nature of contradictions in mathematical contexts and seek solutions that are consistent with broader mathematical principles. In mathematical contexts, contradictions often indicate errors in thinking or arguments. Therefore, trained critical thinkers will try to identify conflicting or inconsistent assumptions, and through systematic and logical critical thinking, they will try to find the weak points in the reasoning or problem that cause such contradictions. In solving mathematical problems of contradiction, it is important to have high precision and accuracy in analyzing each step of the argument, questioning the underlying assumptions, and looking for alternative ways to solve the problem.

In solving contradictory mathematical problems requires students to understand the theory of concepts learned. Before working on problems that are contradictory, the emergence of inquisitiveness encourages students' ability to think critically. Inquisitiveness owned by prospective teachers helps teach students to have critical thinking skills. The initial ability to show inquisitiveness by asking questions. This is in line with the results of research showing that the ability to ask questions as one of the characteristics of inquisitiveness in this study using method triangulation by comparing the consistency between the results of work on contradiction math problems with interview transcripts. Triangulation of methods was carried out continuously during the data collection process on the research subject. The purpose of the triangulation in question is so that the data obtained is valid and consistent [38].

In mathematical contexts, contradictions often indicate errors in thinking or arguments. Therefore, trained critical thinkers will try to identify conflicting or inconsistent assumptions, and through systematic and logical critical thinking, they will try to find the weak points in the reasoning or problem that cause such contradictions. In solving mathematical problems of contradiction, it is important to have high precision and accuracy in analyzing each step of the argument, questioning the underlying assumptions, and looking for alternative ways to solve the problem.

5. Conclusion

The results of the research show that prospective elementary school teachers have Inquisitiveness by fulfilling two indicators, namely searching for information first in an effort to find alternative answers, asking questions by providing notes. Inquisitiveness and critical thinking play an important role in solving mathematical problems, including problems involving contradictions. Therefore, prospective teachers need to analyze problems carefully, identify existing contradictions, and explore possible solution strategies. Inquisitiveness motivates the search for additional knowledge and deeper understanding of contradictions, while the critical thinking disposition allows for in-depth analysis and evaluation of evidence and alternative solutions. By combining these two aspects, prospective teachers can overcome contradictions and develop a better understanding of mathematics as a whole.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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References

[1] P. A. Facione, "Critical thinking: What it is and why it counts," Retrieved: https://www.insightassessment.com/CT-Resources/Teaching-For-and-About-Critical-Thinking/Critical-Thinking-What-It-Is-and-Why-It-Counts/Critical-Thinking-What-It-Is-and-Why-It-Counts-PDF, 2011.

[2] L. Watson, *Curiosity and inquisitiveness*. USA: The Routledge Handbook of Virtue Epistemology, 2018.

[3] J. A. Litman, O. C. Robinson, and J. D. Demetre, "Intrapersonal curiosity: Inquisitiveness about the inner self," *Self and Identity*, vol. 16, no. 2, pp. 231-250, 2017. https://doi.org/10.1080/15298868.2016.1255250
[4] L. Watson, "Educating for inquisitiveness: A case against exemplarism for intellectual character education," *Journal of Moral Education*, vol. 48, no. 3, pp. 303-315, 2019. https://doi.org/10.1080/03057240.2019.1589436
[5] C. Chin, "Students' questions: Fostering a culture of inquisitiveness in science classrooms," *School Science Review*, vol. 86, no. 314, pp. 107–112, 2004.
[6] F. Kezer and B. Turker, "Comparison of the critical thinking dispositions of (studying in the secondary science and mathematics division) preservice teachers," *Procedia-Social and Behavioral Sciences*, vol. 46, pp. 1279-1283, 2012. https://doi.org/10.1016/j.sbspro.2012.05.288
[7] D. Kurniati, H. Hobri, A. R. Asari, and S. Osman, "Math teacher questions can help students around coffee plantations to behave critical thinking," *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, vol. 11, no. 1, pp. 443-454, 2022. https://doi.org/10.24127/ajpm.v11i1.4446
[8] Z. Ismail and M. Mohamed, "Perceptions of critical thinking in teaching mathematics among pre- service teachers," *International Journal of Education and Practice*, vol. 4, no. 5, pp. 181–190, 2016.
[9] G. Primiero, F. Raimondi, M. Bottone, and J. Tagliabue, "Trust and distrust in contradictory information transmission," *Applied Network Science*, vol. 2, no. 1, pp. 1-30, 2017. https://doi.org/10.1007/s41109-017-0029-0
[10] J. M. Lodge, G. Kennedy, L. Lockyer, A. Arguel, and M. Pachman, "Understanding difficulties and resulting confusion in learning: An integrative review," *Frontiers in Education*, vol. 3, pp. 1–10, 2018. v
[11] J. N. Contreras, "Pose and solve varignon converse problems," *Mathematics Teacher*, vol. 108, no. 2, pp. 98-106, 2014. https://doi.org/10.5951/mathteacher.108.2.0098
[12] A. R. As'ari, D. Kurniati, S. Maharani, and H. Basri, *Various mathematical problems to develop critical thinking dispositions*. Indonesia: Universitas Negeri Malang, 2019.
[13] E. M. Sosu, "The development and psychometric validation of a critical thinking disposition scale," *Thinking skills and creativity*, vol. 9, pp. 107-119, 2013. https://doi.org/10.1016/j.tsc.2012.09.002
[14] Ö. Korkmaz, "The impact of critical thinking and logico-mathematical intelligence on algorithmic design skills," *Journal of Educational Computing Research*, vol. 46, no. 2, pp. 173-193, 2012.
[15] J. Boaler, "Exploring the nature of mathematical activity: Using theory, research andworking hypotheses' to broaden conceptions of mathematics knowing," *Educational Studies in Mathematics*, vol. 51, no. 1, pp. 3-21, 2002.
[16] S. R. Crow and L. Kastello, "The dispositions of elementary school children of individualistic and collectivist cultures who are intrinsically motivated to seek information," *School Library Research*, vol. 19, no. 1, pp. 1–23, 2016.
[17] M. P. Arnone, R. V. Small, S. A. Chauncey, and H. P. McKenna, "Curiosity, interest and engagement in technology-pervasive learning environments: A new research agenda," *Educational Technology Research and Development*, vol. 59, no. 2, pp. 181-198, 2011. https://doi.org/10.1007/s11423-011-9190-9
[18] D. Kurniati, A. a. Purwanto, A. R., S. Dwiyana, and H. Susanto, "Development and validity of problems with contradictory information and no specified universal set to measure the truth-seeking of pre-service mathematics teachers," *TEM Journal*, vol. 8, no. 2, pp. 545–553, 2019. https://doi.org/10.18421/TEM82-30
[19] R. M. Ryan and E. L. Deci, "Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions," *Contemporary Educational Psychology*, vol. 61, p. 101860, 2020. https://doi.org/10.1016/j.cedpsych.2020.101860
[20] F. Boylan, L. Barblett, and M. Knaus, "Early childhood teachers' perspectives of growth mindset: Developing agency in children," *Australasian Journal of Early Childhood*, vol. 43, no. 3, pp. 16-24, 2018. https://doi.org/10.23965/AJEC.43.3.02
[21] E. L. Mann, S. A. Chamberlin, and A. K. Graefe, *The prominence of affect in creativity: expanding the conception of creativity in mathematical problem solving*. Springer International Publishing Switzerland. https://doi.org/10.1007/978-3-319-38840-3_5, 2017.
[22] R. Wiradinata, C. Rosita, and S. Amalia, "How is the mathematical critical thinking disposition of vocational school students in online learning during the COVID-19 pandemic?," in *Journal of Physics: Conference Series, IOP Publishing*, 2021, vol. 1918, no. 4, p. 042096, doi: https://doi.org/10.1088/1742-6596/1918/4/042096
[23] C. P. Dwyer, M. J. Hogan, O. M. Harney, and C. Kavanagh, "Facilitating a student-educator conceptual model of dispositions towards critical thinking through interactive management," *Educational Technology Research and Development*, vol. 65, no. 1, pp. 47-73, 2017. https://doi.org/10.1007/s11423-016-9460-7
[24] S. Quinn, M. Hogan, C. Dwyer, P. Finn, and E. Fogarty, "Development and validation of the student-educator negotiated critical thinking dispositions scale," *Thinking Skills and Creativity*, vol. 38, p. 100710, 2020. https://doi.org/10.1016/j.tsc.2020.100710
[25] D. H. Tong, N. P. Loc, B. P. Uyen, and T. H. Son, "Enhancing creative and critical thinking skills of students in mathematics classrooms: An experimental study of teaching the inequality in high schools," *Universal Journal of Educational Research*, vol. 8, no. 2, pp. 477-489, 2020. https://doi.org/10.13189/ujer.2020.080219
[26] E. R. Wulan and N. F. Ilmiyah, "Prospective mathematics teachers' critical thinking processes in dealing truth-seeking problem with contradictory information," in *Proceedings of the 2nd National Conference on Mathematics Education 2021 (NaCoME 2021)*, 2022, vol. 656, pp. 90–100, doi: https://doi.org/10.2991/assehr.k.220403.013.

[27] L. Elder and R. Paul, *The thinker's guide to analytic thinking: How to take thinking apart and what to look for when you do*. USA: Rowman & Littlefield, 2019.

[28] A. Bicer, Y. Lee, C. Perihan, M. M. Capraro, and R. M. Capraro, "Considering mathematical creative self-efficacy with problem posing as a measure of mathematical creativity," *Educational Studies in Mathematics*, vol. 105, no. 3, pp. 457-485, 2020. https://doi.org/10.1007/s10649-020-09995-8

[29] M. A. Miles, M. B. Huberman, and J. Saldana, *Qualitative data analysis*, 3rd ed. Washington DC: Sage Publication, 2014.

[30] K. Van Turnhout, C. Köppe, P. Schuszler, T. Tankink, and R. Bakker, "Research education nurtures inquisitiveness of professional design and engineering students," presented at the Proceedings of the 20th International Conference on Engineering and Product Design Education, E and PDE, 2018.

[31] U. Umah and A. Rahmawati, "Pre-service teachers' inquisitiveness in mathematics learning," *Jurnal Pengembangan Pembelajaran Matematika*, vol. 5, no. 2, pp. 117-129, 2023.

[32] T. Santoso, L. Yuanita, and E. Erman, "The role of student's critical asking question in developing student's critical thinking skills," *Journal of Physics: Conference Series, IOP Publishing*, vol. 953, p. 012042, 2018. https://doi.org/10.1088/1742-6596/953/1/012042

[33] A. Irvine, P. Drew, and R. Sainsbury, "'Am I not answering your questions properly?'Clarification, adequacy and responsiveness in semi-structured telephone and face-to-face interviews," *Qualitative Research*, vol. 13, no. 1, pp. 87-106, 2013. https://doi.org/10.1177/1468794112439086

[34] B. Arisoy and B. Aybek, "The effects of subject-based critical thinking education in mathematics on students' critical thinking skills and virtues," *Eurasian Journal of Educational Research*, vol. 92, pp. 99-119, 2021. https://doi.org/10.14689/ejer.2021.92.6

[35] M. Gauvain, R. L. Munroe, and H. Beebe, "Children's questions in cross-cultural perspective: A four-culture study," *Journal of Cross-Cultural Psychology*, vol. 44, no. 7, pp. 1148-1165, 2013. https://doi.org/10.1177/0022022113485430

[36] J. Syahfitri, H. Firman, S. Redjeki, and S. Sriyati, "Construct validity of critical thinking disposition test in biology," *Jurnal Bioedukatika*, vol. 8, no. 1, p. 1, 2020. https://doi.org/10.26555/bioedukatika.v8i1.11031

[37] E. E. Peter, "Critical thinking: Essence for teaching mathematics and mathematics problem solving skills," *African Journal of Mathematics and Computer Science Research*, vol. 5, no. 3, pp. 39-43, 2012. https://doi.org/10.5897/ajmcsr11.161

[38] U. Umah, A. R. Asari, S. Sukoriyanto, and S. Sisworo, "Students' inquisitive questions predict their understanding of mathematics texts," *Acta Scientiae*, vol. 25, no. 6, pp. 29-59, 2023. https://doi.org/10.17648/acta.scientiae.7466