ANALYSIS OF PROSPECTIVE ELEMENTARY SCHOOL TEACHERS' INQUISITIVENESS IN SOLVING MATHEMATICS PROBLEMS

Fida Rahmantika Hadi [1], Swasti Maharani [1]

[1] Universitas PGRI Madiun, Indonesia

**Corresponding Address*: *swasti.mathedu@unipma.ac.id*

Received: 20 October 2022 | Approved: 26 November 2022 | Published: 29 December 2022

Abstract: Teachers must model critical thinking skills and dispositions in front of their students. This is useful for helping students develop their critical thinking skills. Inquisitiveness is one part of the critical thinking disposition that teachers need to have. However, there is still very little research investigating the readiness of prospective teachers in critical thinking dispositions, especially inquisitiveness. This research is intended to determine the level of curiosity of prospective elementary school teachers. This research uses a descriptive qualitative research method, case study type, data, and data sources obtained from 20 prospective elementary school teacher informants in Madiun. Four indicators of inquisitiveness were identified from this case study: Asking questions, seeking information, feeling interested, and final investigation/evaluation. The curiosity of most primary school teacher candidates has not met the four indicators. Few fulfill only one indicator, namely seeking information, and very rarely fulfill three indicators. It can be concluded that prospective elementary school teachers do not yet have the disposition to think critically, especially inquisitiveness. There is a need to improve teacher education learning to improve their students' critical thinking skills and dispositions.

Keywords: Inquisitiveness, Prospective Elementary School Teachers, PWNSUS Problem

 *DOI: **10.37680/qalamuna.v14i2.3854***

INTRODUCTION

Inquisitiveness is one part of the critical thinking disposition. Inquisitiveness is considered similar or the same as curiosity. In its development, curiosity is still rarely researched. Curiosity and inquisitiveness are the main components of intelligence (Watson, 2018). Inquisitiveness is someone's motivation to ask questions. The questions asked are genuine questions or based on reasoning. So don't just ask. These questions are based on the content of something that is not just an ordinary question.

Such questions can help learners begin the process of hypothesizing, predicting, experimenting, and explaining, thereby leading to a cascade of generative activities and helping them acquire missing knowledge or resolve conflicts in their understanding (Annisa, 2019). When students are socially engaged in talk and activities about a shared problem or task, individual questions can stimulate other group members to use these strategies and thinking processes. Questions embedded in peer group conversations help students build knowledge together (Chin, 2004).

Inquisitiveness is a main intelligence that must be developed/learned (Watson, 2019). The importance of developing inquisitiveness is. First, curiosity is a good scientific motivation: it plays a major role in questioning intelligence. Good or positive curiosity can be cultivated and increase intelligence. Second, curiosity has a special relationship with intellectual skills in asking questions well. People who have good curiosity have characteristics that can motivate and engage in goodness (Watson, 2015). Therefore, curiosity can be characterized as a positive response'. Thus, good curiosity includes important intellectual skills for intellectual character development. Good questions act not only as a stimulus for intellectual inquiry but also as a guide to continued inquiry and as a valuable tool in the intellectual development of others, such as open-mindedness, intellectual humility, and intellectual courage (Watson, 2018). Thus, curiosity plays a role in the intellectual initiation of inquiry and the intellectual development of character.

Inquisitiveness is considered like curiosity. There are two types of curiosity, namely I-type and D-type curiosity. Previous studies said that inquisitiveness falls into the D-type group (Gruber et al., 2014; Litman et al., 2017; Powell et al., 2017). D-type curiosity is a more intense “need to know” involving a disturbing experience of confusion, which is activated by finding information gaps in the associative knowledge network that successfully fills these gaps to satisfy D-type curiosity highly beneficially (Gruber et al., 2014). D-type curiosity is positively correlated with negative affect and concern about the accuracy of newly attained knowledge. D-type curiosity is hallmarked by persistence in “connecting the dots” to resolve problems (Koo & Choi, 2010; Lauriola et al., 2015; Litman et al., 2005; Litman, 2010; Litman & Mussel, 2013; Richards, Litman, & Roberts, 2013).

Curiosity is also needed in learning. The higher a person's curiosity, the more knowledge they have. However, this is not to conditions where students lack curiosity. Teachers become centered and active learners, while students tend to be passive and lazy to ask questions. If they don't understand, they tend to remain silent and surrender. In typical classroom settings, students are often expected to answer questions rather than ask them. Few students spontaneously ask high-quality thinking questions (Salmon & Barrera, 2021). Ozan & Kincal (2018) reported that low levels of questioning and explanation on the part of students were negatively correlated with achievement and concluded that strategies used in the classroom and the curriculum must require more questioning and explaining on the part of students.

In teaching mathematics, prospective teachers must have a high level of curiosity or curiosity (Breuninger, 2022). Elementary school teachers with a high level of curiosity will be better able to educate and guide their students. Some justifications for why curiosity is important in this unique situation for students, for example, teachers who demonstrate interest will provide a true role model for students. They will awaken students to have the same disposition towards mathematics and learning. Mathematics often requires problem solving (As'ari et al., 2019). Curious teachers will look for innovative ways to handle numerical questions, which can encourage students to do the same (Kang, 2020).

Conceptual research also illustrates the importance of curiosity in the context of mathematics education in Primary School Teacher Education (PGSD). Curiosity is the key to motivating PGSD teachers to investigate mathematical concepts more deeply (Litman et al., 2017). When highly curious teachers are more likely to seek a deeper understanding of their teaching material. This can inspire them to adopt more innovative and different teaching methods to explain mathematical concepts to students (Rich, 2022).

Curiosity also encourages PGSD teachers to always look for improvements in their learning materials. They will continually seek new resources, more effective teaching methods, and different ways of learning to improve the quality of mathematics education they provide to students. Curious teachers will engage in ongoing professional development, such as taking additional training, attending seminars, and reading the latest literature in mathematics education. Curiosity can also influence PGSD teachers' relational abilities. They will try to explain mathematical concepts more simply and easily for students to understand. By adapting language and teaching methods to suit students' understanding, curious teachers can help students understand mathematics better. In addition, they will also encourage students to actively ask questions and participate in mathematics learning, creating an environment where questions and exploration are given high value.

Comprehensive efforts need to be made to foster curiosity in prospective PGSD teachers. Additional training, seminars, and current mathematics education literature can be a first step. In addition, collaboration with other teachers and experienced mentors can help develop curiosity in the context of mathematics learning. These approaches aim to support elementary school students' growth and understanding of mathematics, create more meaningful learning experiences, and prepare PGSD teachers who are more qualified to teach mathematics to future generations. I suspect the more curious our teachers are, the more students want to know. And with curiosity, we can help them become better problem seekers and solvers and develop their abilities to change the world. So, this research is important considering the importance of students' curiosity in learning, which can encourage and improve their critical thinking. It is important to know the inquisitiveness of prospective teachers because prospective teachers will play a role in learning and will educate female students at school (Chin, 2004; Litman et al., 2017). Prospective teachers are the spearhead of successful learning and must be sharpened and trained (Akiri & Dori, 2021). Knowing how much inquisitiveness a prospective teacher has will impact educational progress (Kang, 2020; Watson, 2018). Apart from that, it can be the basis for other research in developing the critical thinking disposition of prospective teachers.

One of the mathematical problems that can reveal the curiosity of prospective teachers is the PWNSUS type mathematical problem (Problem with No Specific Universal Set). PWNSUS is a type of math problem that stimulates critical thinking and curiosity. When someone doubts the correctness of the information in a PWNSUS question, they look for a deeper understanding and the correct solution. It develops analytical thinking skills that are important in mathematics and everyday life. PWNSUS stimulates deeper investigation and problem solving, making it a valuable learning tool.

Based on observations made, it was found that prospective elementary school teachers have low curiosity. This can be seen during the learning process. Students tend not to ask the problems given by the lecturer. Even when given problems that lecturers deliberately blame, the prospective elementary school Teachers students are unaware and prefer to remain silent.

Previous research that discussed the PWNSUS problem was research conducted by Mira Rahmawati, Dian Kurniati, Dinawati Trapsila Siwi, and Syarifah Osman with the title the students The King behavior in solving the problem with no space universal set based on each problem solving research results showed that students tend not to behave critically thinking when working on problems with an unknown universe. Based on the ideal model, students carry out the stages contained in the ideal model. Even though they do not use all the existing stages, students tend not to provide conclusions to the objectives after working on the question (Rahmawati et al., 2021).

The second research is Dewi et al. (2020). Their article analyzes the process of asking students questions in solving universal problems. This research describes asking students questions in solving universal problems in rectangular material. Problem solving proposed by students is adjusted to the problem solving steps, namely understanding the problem, making a plan, implementing the plan, and checking again. This research method is qualitative descriptive qualitative. The instruments used are tests and interviews. Selected subjects are determined based on the answers given by students, with a minimum of 2 possible answers accompanied by supporting reasons and evidence. Selected objects are given a stage 2 test, and then interviews are conducted with different students depending on the answers. Subject type 1 and subject 3 go through three stages of asking questions: finding out the specific situation and concentration, planning an investigation, asking questions, and checking answers. The process that differentiates asking questions between type 1 and type 3 subjects is that type 1 does not try the wide possibilities of the rectangle where type 1 subjects are confused, so there are no different questions from type one tactics. Type 3 subjects have tried all other possible areas of the rectangle so that when they are sure of the problem being solved, there are no questions at the final stage. The similarities between the studies are that they both examine the disposition to think critically, while the difference is that the previous study examined truth seeking, while this study examines inquisitiveness.

Furthermore, Fusaro & Smith's (2018) research states that curiosity is closely related to a person's problem solving process. It is highly recommended to research inquisitiveness in the problem solving process in various fields of science and all ages. What this research has in common with research conducted by researchers is that they both examine inquisitiveness. The difference in research lies in the subjects studied.

Based on the studies conducted, researchers did not find any research on the curiosity of prospective elementary school teachers in solving mathematical problems. So there needs to be research on that. This research is very urgent considering the importance of critical thinking in a prospective elementary school teacher. With this research, it is hoped that the results can be used as a reference for policy stakeholders in formulating future education development strategies.

METHODS

This research is a qualitative descriptive study. Data were collected through observation, tests, and interviews. The criteria for this research subject were prospective elementary school teachers who had taken teaching practice courses. In this study, 127 prospective elementary school teachers were observed. Only 20 prospective teachers were willing to solve problems and were interviewed regarding their inquisitiveness. They are already in the final semester of their 3rd year at the undergraduate level. The authors invited them to participate in this study, and they were given the following complete assignment as an instrument for this study.

Given x2 = 4, what is the value of x?

In his research, the author made in-depth observations of individual works during the problem solving process. They carefully observe how the individual faces and solves mathematical problems. This observation aims to gain insight into the thinking dispositions of research subjects when facing mathematical challenges. Furthermore, the author also conducted interviews with research subjects to understand better their potential to solve mathematical problems. The interviews were conducted in a semi-structured form, which means the researcher had a pre-drafted interview guide but also allowed for further development of questions based on the answers given by the research subjects. This approach provides flexibility to dig deeper into the subject's understanding of their thinking dispositions.

The research instrument used was a no universal set type mathematical problem. This type of problem was chosen because it can reveal how individuals face mathematical challenges that do not have universal or fixed solutions. Using this instrument, the author can investigate a person's thinking disposition when faced with mathematical situations that require critical and creative thinking. The overall methodology of this research provides deep insight into how individuals face and solve complex mathematical problems and their potential to develop supportive thinking dispositions in mathematics.

RESULTS AND DISCUSSIONS

This research process began by conducting observations, tests, and interviews with prospective elementary school (SD) teachers at one of the universities in Madiun City. Initially, 127 prospective elementary school teachers were the subjects of observation at the university. However, of this number, only 20 people were willing to become research subjects. These subjects were then given a no universal set type problem test to measure their inquisitiveness in solving mathematical problems that did not have a universal solution.

The results of the test revealed variations in the subjects' answers. A total of 11 subjects answered that the value of x was two because if the number 2 is squared, the result is 4. Furthermore, eight subjects answered that the value of x could be -2 or 2. One subject also gave a more complex answer by stating that the value of x can be -2 or 2, or there may be another appropriate value. These results reflect three different types of answers from research subjects.

The conclusion of the test results shows variations in the subjects' thinking and approaches to mathematical problems that do not have universal solutions. These results provide important insights into understanding their thinking dispositions, particularly in the context of curiosity. The results of this research can be a basis for developing more effective teaching strategies in improving critical thinking skills and mathematical understanding among prospective elementary school teachers.

Subjects with the first type of answer, namely those who answered that the value of x was 2, depicted a fairly simple thought pattern in solving mathematical problems. In the interview process, it was seen that the first type of subject did not make any effort to dig deeper or evaluate the complexity of the problem. They face the question "What is the value of x?" and respond with an answer they might consider the simplest solution.

During the interview, subjects of the first type do not ask additional questions or look for information that may be missing. They tend to accept existing premises without doubting them. This reflects inactivity in exercising curiosity, where they do not explore other possible answers or look into the complexity of the problem. These subjects also did not show a strong interest in the problem because they quickly decided that it was easy and could be solved easily.

Thus, subjects of the first type tend not to fulfill the four indicators of inquisitiveness, namely, not realizing the shortcomings in the problem, not actively seeking additional information, not showing strong interest, and not carrying out further investigations. They consider the problem quite simple and do not consider it necessary to question or dig deeper. This indicates a lack of understanding of the complexity of mathematics and the need to develop a deeper understanding of critical thinking dispositions in the context of problem solving.

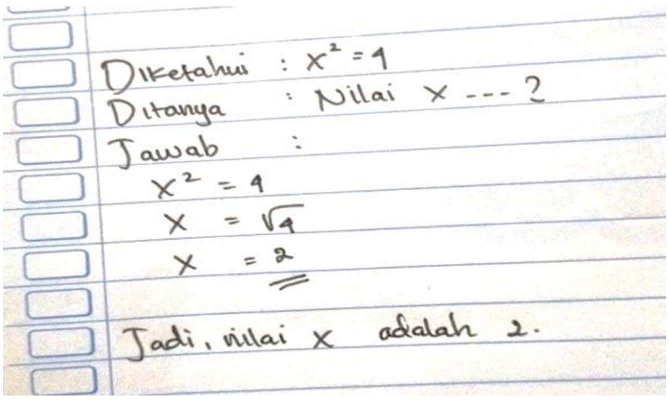

Figure 1. The answer subject type 1

Subjects who gave the second type of answer, namely those who stated that the value of x could be -2 or 2, showed a more complex thought pattern than the first type of subject. Eight subjects gave this type of answer, which implies a slightly deeper understanding of the given mathematical problem. They are trying to find a value of x that meets the requirements of the problem, namely a value that, when squared, produces 4. However, it should be noted that the problem does not explicitly state that x must be an integer. Interviews with the second type of subjects revealed that they tended to be unaware of deficiencies in the information provided in the questions. They consider the problem correct and complete, even if more specific information about x is not provided. These subjects also stated that they often encountered problems of a similar type, so they tended to accept the existing premise without doubting it. Scientifically, subjects of the second type show a slightly higher level of curiosity than subjects of the first type because they try to find a value of x that meets the requirements of the problem. However, they also show a lack of awareness of the lack of information on the problem and tend to accept the existing premise without doubting it. This indicates the importance of developing deeper critical thinking skills in the context of solving complex mathematical problems.

The second type of subject does not meet the four indicators of inquisitiveness. In the first indicator, the subject does not ask anything to the question giver and immediately solves it. So, in the type of subject with the second type of answer, they tend to think that the second indicator is looking for information because they already think the question is correct and are sure, so they don't want to look for additional information from the question. They tend to remain silent and work on the questions, feeling that the answer is correct, and do not seek further information from the question giver. Then, for the third indicator, subjects with the second type of answer also do not meet the third indicator, namely interviews, when the question giver is seen during the interview, because of that matter. In the interview, the subject stated that the questions discussed were ordinary and common questions that often appeared in textbooks or had often been asked by teachers at school. They felt the questions were easy and did not require further investigation, so they were confident in their answers. However, when the researcher asked about the subject's knowledge of number material, the subject revealed that his knowledge was limited to only a few numbers, such as natural numbers, whole numbers, squares, primes, and whole numbers. This indicates that the subject's knowledge is limited, so he does not need further investigation. In conclusion, the subject felt confident in his answer, but his knowledge of various types of numbers was limited, which shows the limitations of his knowledge in this matter. Following are the answers from the second type of subject,

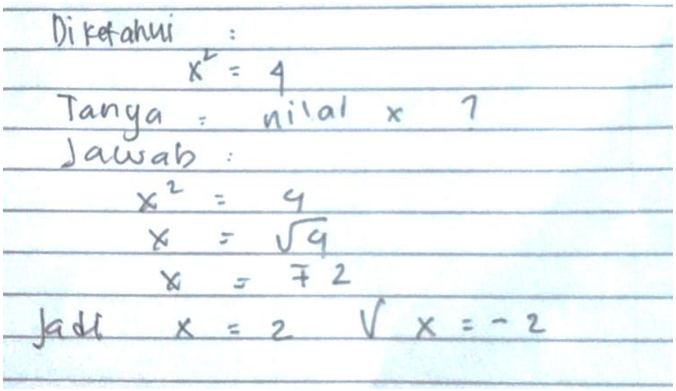

Figure 2. The answer subject type 2

Furthermore, for the third type of subject, subjects who answer that the value of x can be two or negative two or something else. What is meant here is that if x squared is a distance, then x is 2. If x is just a mathematical number, then x is two and negative 2. In the interview, the results were obtained. The interview subjects' answers reflect a mature approach to understanding the questions. Mathematics. The subject stated emphatically that these questions were not wrong, but the determination depended on the context. In the example given regarding the number "x," the Subject explains that the correct answer is two in the context of distance because distance cannot have a negative value in everyday physical contexts. However, Subjects also leave open the possibility that answers may vary depending on the particular context.

The Subject Approach highlights an important concept in mathematics, namely understanding context. This shows that in solving mathematical problems, it is important to find a numerical answer and understand the situation or context in which the problem occurs. Thus, Subject emphasizes that correct answers in mathematics often depend on a deep understanding of the context, an important aspect in developing critical thinking in mathematics. Apart from that, the Subject also revealed that teachers often gave these questions to students as an exercise in finding the value "x" without needing further investigation. This illustrates how mathematics education can sometimes focus more on finding the right answer than understanding the concepts or critical thinking behind the answer. However, understanding context and in-depth problem solving are important skills in mathematics that should be improved. Following are the answers from type 3 subjects,

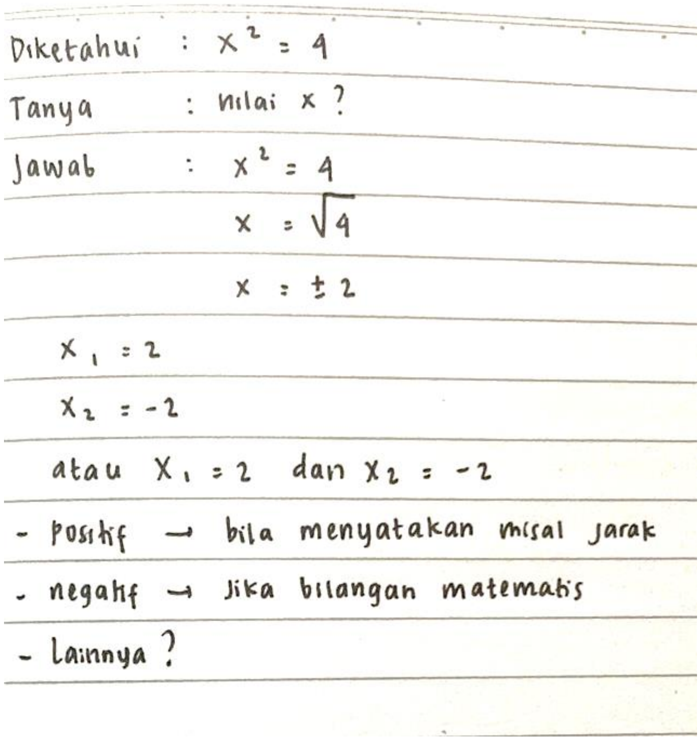

Figure 3. The answer to Subject type 3

Most prospective elementary school teachers answered these questions quickly and confidently. The answer that appears is x=2; x=2 or x=-2. All subjects' answers are almost identical, assuming x is an integer. They don't know what's wrong with the questions. They assume that the information in the problem is clear enough to solve it. Curiosity does not arise in all subjects at all. The indicator of asking questions also did not appear at all. Interest in the questions only appeared in a minority of subjects. The interest that arises is only in solving it, not finding out the oddities in the problem. On average, almost 80% of subjects evaluated their final answers.

Discussion

The inner drive that encourages students to seek a deeper understanding of mathematical concepts, ask questions, and try to solve mathematical problems is called students' curiosity in learning mathematics (Watson, 2018). This curiosity can aid students' ability to understand and perform well in mathematics. This idea has been captured and expressed by several educational experts. Some expert opinions regarding students' interest in learning mathematics are as follows (Frías, 2016; Haste, 2017; Johri, 2015; Standal, 2016):

By providing challenging assignments, encouraging students to explore, and providing constructive feedback, educators can help awaken students' curiosity about mathematics (Dagiene & Dolgopolovas, 2022). Students with a strong curiosity can improve their math skills and gain a deeper understanding (Litman et al., 2017). When solving an incomplete math problem, student awareness refers to the student's capacity to recognize relevant concepts, determine what information is missing from the problem, and apply what they know to solve it. An important component of effective mathematical problem solving is this kind of awareness. Students' awareness of solving incomplete mathematics problems is the key to building a strong understanding of mathematics (Bubnó & Takács, 2022).

Students' awareness of incorrect understanding of questions in mathematics or other subjects reveals several important aspects. First, this awareness includes students' ability to recognize their mistakes. Students aware of their mistakes can distinguish between their lack of understanding of the material, which is the first step in understanding and overcoming these mistakes. Furthermore, understanding the types of errors made becomes relevant. Students who can understand questions answered incorrectly are likely to recognize the type of error they made, whether it was a conceptual error, incorrect interpretation of instructions, or another error in information processing. This allows them to evaluate and improve their understanding. Additionally, another important aspect is the corrective actions taken by students. Students' awareness of incorrect understanding of questions encourages them to take constructive action to improve their understanding. They may seek help from an instructor, discuss with peers, or seek additional sources of information. This ability shows that students' awareness is the first step towards developing better metacognition, namely their understanding of how they learn and deal with information. This awareness can also help students build resilience to failure and disappointment, as they are more likely to try to understand and overcome their mistakes rather than give up quickly. Awareness of misconceptions in mathematics or other subjects provides a strong foundation for developing deep understanding and effective problem solving (Krishnasamy, 2021).

The interest of prospective Primary School Teacher Education (PGSD) teachers in solving incomplete mathematics problems can vary from individual to individual, influenced by several factors such as personal interest, motivation, and educational background (Ahmat, 2022). According to Miscevic (2023), three curiosity levels can be observed. First, PGSD candidates with a high interest in mathematics tend to be active in solving incomplete problems. They will intensively search for missing information, ask questions, and design creative solutions to overcome existing challenges. Second, some prospective PGSD teachers may be moderately interested in solving incomplete mathematics problems. They will try to understand the problem and find a solution, although perhaps not as actively or patiently as those who are curious. Finally, it is also possible that some PGSD participants were not interested in overcoming numerical information deficits. They tend to rely on existing data or may be less interested in exploring a deeper understanding of the problem. Additionally, factors such as previous mathematics education, experience in teaching or learning mathematics, level of confidence in solving mathematics problems, and comfort in dealing with uncertainty in mathematics may also influence this level of interest. Curiosity levels can fluctuate over time as a result of learning and experience. By continuing to learn and practice solving various mathematical problems, prospective PGSD teachers can develop more curiosity. Support from an individual coach or educator can also help increase curiosity in answering deficient numerical questions. Teachers in PGSD with a higher level of curiosity have greater opportunities to teach and inspire their students to have the same attitude toward mathematics.

Many factors cause the curiosity of prospective elementary school teachers to be low or even not yet interested, including their lack of mathematical ability. Inquisitiveness is one component of the critical thinking disposition. This aligns with Maharani et al. (2019), which states that students' thinking dispositions are still low and need further improvement. In learning mathematics, several factors can cause students not to realize the truth of the teacher's questions (Dagiene & Dolgopolovas, 2022). One of them is a lack of understanding of basic ideas in mathematics, which makes it difficult for them to distinguish right from wrong questions. A lack of attention or apathy toward learning material can also make students lose focus and not understand the questions asked. Fear or worry about mathematics can also be an obstacle because students who feel anxious about mathematics tend to be unsure about the correctness of their answers. In addition, relying completely on the teacher without self-verification, teacher communication errors, lack of active participation in learning, and the inability to use metacognition can also cloud students' understanding of the mathematics questions posed by the teacher. These factors can influence students' ability to realize and understand the truth of mathematics questions well. Teachers can take several steps, such as providing clear explanations and examples, encouraging questions from students, and activating students in problem solving to help students realize the truth of problems in mathematics learning (Akiba et al., 2019) and creating a learning environment that encourages students to feel comfortable asking questions and seeking better understanding (Aartun et al., 2022; Standal, 2016).

CONCLUSION

The research results show that the indicators of inquisitiveness in prospective elementary school (SD) teachers are largely unmet and provide a significant picture of the challenges in elementary school teacher education. It was found that prospective elementary school teacher students do not yet fully have the ability to curiosity, which is an important component in developing critical thinking. Therefore, corrective measures must be implemented immediately. Reviewing the learning practices and curriculum design used in elementary school teacher education is recommended. This may include integrating lessons or methods that focus more on developing inquisitiveness. Additionally, it is important to increase the teaching of critical thinking dispositions, including inquisitiveness, as an integral part of teacher education curricula. Teacher educators must engage in follow-up studies to investigate best practices to improve prospective elementary teachers' critical thinking skills and dispositions. In this way, teacher education can be more effective in preparing prospective elementary school teachers to develop the critical thinking skills needed in their teaching in the classroom. This is a crucial step to improve the quality of basic education and help students develop deeper and critical thinking skills. With this research, educators can use the results to develop learning methods/strategies to increase students' critical thinking abilities.

REFERENCES

Aartun, I., Walseth, K., Standal, Ø., & ... (2022). Pedagogies of embodiment in physical education–a literature review. *Sport, Education and ...*, *Query date: 2023-08-10 09:00:16*. https://doi.org/10.1080/13573322.2020.1821182

Ahmat, N. (2022). Knowledge, Skills, and Attitude of Pre-Service Mathematics Teachers Towards Higher-Order Thinking Skills. *International Journal of Educational Methodology*, *8*(4), 795–804. https://doi.org/10.12973/ijem.8.4.795

Akiba, M., Murata, A., Howard, C., & Wilkinson, B. (2019). Lesson study design features for supporting collaborative teacher learning. *... and Teacher Education*, *Query date: 2023-08-10 09:00:16*. https://www.sciencedirect.com/science/article/pii/S0742051X17312933

Akiri, E., & Dori, Y. J. (2021). Professional Growth of Novice and Experienced STEM Teachers. *Journal of Science Education and Technology*, *31*(1), 129–142. https://doi.org/10.1007/s10956-021-09936-x

Annisa, N. (2019). Profil Kualitas Keterampilan Bertanya Mahasiswa Calon Guru Dalam Pembelajaran Sains. *Pedagonal: Jurnal Ilmiah Pendidikan*, *3*(2). https://journal.unpak.ac.id/index.php/pedagonal/article/view/1302

As'ari, A. R., Kurniati, D., Maharani, S., & Basri, H. (2019). Ragam soal matematis untuk mengembangkan disposisi berpikir kritis. *Universitas Negeri Malang*.

Breuninger, H. (2022). Commitment, inquisitiveness, creativity, empathy: Dr. Christoph R. Löser in conversation with Prof. Dr. Helmut Breuninger. *Aktuelle Dermatologie*, *48*(7), 298–298. https://doi.org/10.1055/a-1716-4738

Bubnó, K., & Takács, V. L. (2022). Mathematical and computational awareness before and after the pandemic. *Frontiers in Education*, *7*, 933339. https://doi.org/10.3389/feduc.2022.933339

Chin, C. (2004). *Students' questions: Fostering a culture of inquisitiveness in science classrooms*. *Query date: 2023-08-27 08:52:44*. https://repository.nie.edu.sg/bitstream/10497/4741/1/SSR-86-314-107.pdf

Dagiene, V., & Dolgopolovas, V. (2022). Short Tasks for Scaffolding Computational Thinking by the Global Bebras Challenge. *Mathematics*, *10*(17), 3194. https://doi.org/10.3390/math10173194

Dewi, F. C., Aminudin, M., & Wijayanti, D. (2020). Analisis Proses Pengajuan Pertanyaan Siswa Dalam Menyelesaikan Problems with No Specified Universal Set Given. *Jurnal Ilmiah Soulmath: Jurnal Edukasi Pendidikan Matematika*, *8*(2), 165–181. https://doi.org/10.25139/smj.v8i2.3128

Frías, E. R. (2016). Intellectual emancipation in the digital society: The rancière's ignorant schoolmaster nowadays. *Revista Letral*, *16*, 89–105.

Fusaro, M., & Smith, M. (2018). Preschoolers' inquisitiveness and science-relevant problem solving. *Early Childhood Research Quarterly*, *Query date: 2023-08-27 08:52:44*. https://www.sciencedirect.com/science/article/pii/S0885200617302442

Gruber, M. J., Gelman, B. D., & Ranganath, C. (2014). States of Curiosity Modulate Hippocampus-Dependent Learning via the Dopaminergic Circuit. *Neuron*, *84*(2), 486–496. https://doi.org/10.1016/j.neuron.2014.08.060

Haste, H. (2017). Jerome S. Bruner (1915-2016). *The American Psychologist*, *72*(7), 707–708. https://doi.org/10.1037/amp0000183

Johri, A. (2015). Situative frameworks for engineering learning research. *Cambridge Handbook of Engineering Education Research*, *Query date: 2023-09-18 07:27:58*, 47–66. https://doi.org/10.1017/CBO9781139013451.006

Kang, A. (2020). From inquisitive disjunction to nonveridical equilibrium: Modalized questions in Korean. *Linguistics*, *58*(1), 207–244. https://doi.org/10.1515/ling-2019-0038

Krishnasamy, T. (2021). A Novel Study on Awareness and Preference of College Students towards Educational Based Mobile Application. *2021 7th International Conference on Advanced Computing and Communication Systems, ICACCS 2021*, *Query date: 2023-09-17 18:37:11*, 1916–1921. https://doi.org/10.1109/ICACCS51430.2021.9441899

Litman, J., Robinson, O., & Demetre, J. (2017). Intrapersonal curiosity: Inquisitiveness about the inner self. *Self and Identity, Query date: 2023-08-27 08:52:44*. https://doi.org/10.1080/15298868.2016.1255250

Maharani, S., Nusantara, T., As'ari, A. R., & Qohar, A. (2019). Analyticity and systematicity students of mathematics education on solving non-routine problems. *Mathematics and Statistics*, *7*(2). https://doi.org/10.13189/ms.2019.070204

Miscevic, N. (2023). Curiosity, Checking, and Knowing: A Virtue-Theoretical Perspective. *Acta Analytica*, *38*(1), 53–67. https://doi.org/10.1007/s12136-022-00538-9

Ozan, C., & Kincal, R. Y. (2018). The Effects of Formative Assessment on Academic Achievement, Attitudes toward the Lesson, and Self-Regulation Skills. *Educational Sciences: Theory & Practice*, *18*(1), 85–118. https://doi.org/10.12738/estp.2018.1.0216

Powell, C., Nettelbeck, T., & Burns, N. R. (2017). The incremental validity of intellectual curiosity and confidence for predicting academic performance in advanced tertiary students. *Personality and Individual Differences*, *116*, 51–56. https://doi.org/10.1016/j.paid.2017.04.011

Rahmawati, M., Kurniati, D., Trapsilasiwi, D., & Osman, S. (2021). The Students' Truth-Seeking Behaviour in Solving the Problems with No Specified Universal Set Based on IDEAL Problem Solving. *Kreano Jurnal Matematika Kreatif-Inovatif*, *12*(2), 302–311.

Rich, K. M. (2022). A Learning Trajectory for Variables Based in Computational Thinking Literature: Using Levels of Thinking to Develop Instruction. *Computer Science Education*, *32*(2), 213–234. https://doi.org/10.1080/08993408.2020.1866938

Salmon, A. K., & Barrera, M. X. (2021). Intentional questioning to promote thinking and learning. *Thinking Skills and Creativity*, *40*, 100822. https://doi.org/10.1016/j.tsc.2021.100822

Standal, Ø. F. (2016). Habits, skills, and embodied experiences: A contribution to philosophy of physical education. *Sport, Ethics and Philosophy*, *10*(3), 269–282. https://doi.org/10.1080/17511321.2016.1220972

Watson, L. (2015). What is inquisitiveness? *American Philosophical Quarterly, Query date: 2023-08-27 08:52:44*. https://www.jstor.org/stable/24475463

Watson, L. (2018). Curiosity and inquisitiveness. *The Routledge Handbook of Virtue Epistemology, Query date: 2023-08-27 08:52:44*. https://books.google.com/books?hl=en&lr=&id=bkBvDwAAQBAJ&oi=fnd&pg=PT380&dq=inquisitiveness&ots=2iIaEt3Hd3&sig=70ZJaTxwXOpUKDfgkcDrWiqj5e4

Watson, L. (2019). Educating for inquisitiveness: A case against exemplarism for intellectual character education. *Journal of Moral Education, Query date: 2023-08-27 08:52:44*. https://doi.org/10.1080/03057240.2019.1589436