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Reflections on Elementary School Students' Realistic and Mathematical Curiosity Experiences

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Abstract

This study explored primary school students' mathematical curiosity and curiosity arising from everyday experiences, with particular attention to how students perceived the connections between these two forms of curiosity in mathematics learning. The study employed a qualitative interpretive design involving sixteen third- and fourth-grade primary school students. Data were collected through semi-structured interviews and analyzed using thematic analysis. The findings revealed that students' mathematical curiosity was primarily associated with improving operational skills, exploring different solution strategies, and learning new mathematical topics. Students also frequently connected mathematics with everyday experiences such as shopping, measuring, telling time, and playing games. Furthermore, participants reported that mathematics lessons became more interesting and meaningful when real-life contexts were incorporated into classroom activities. Students emphasized that interactive learning environments, opportunities to ask questions, games, and collaborative activities encouraged their curiosity and engagement in mathematics. Overall, the findings suggest that students perceive meaningful connections between their everyday experiences and mathematics learning, highlighting the value of authentic contexts in supporting curiosity in primary mathematics education. Based on these findings, the study recommends incorporating real-life contexts and student-centered instructional practices to promote curiosity and meaningful engagement in mathematics classrooms.

Key words: *Realistic curiosity, mathematical curiosity, primary school students*

Introduction

Mathematics education research has increasingly emphasized the importance of fostering meaningful learning experiences that promote students' engagement, motivation, and long-term interest in mathematics, particularly during the primary school years. Although mathematics plays a fundamental role in developing reasoning, problem-solving, and critical thinking skills, many students perceive mathematics as abstract, disconnected from their daily lives, and therefore difficult to engage with meaningfully. This perceived disconnect often reduces students' motivation to participate actively in mathematics learning and limits opportunities for meaningful knowledge construction (Arthur et al., 2018; Gainsburg, 2009; Özgen, 2013). Consequently, understanding the factors that encourage students to engage with mathematics in authentic and meaningful ways has become an important concern in contemporary mathematics education research.

Among the factors that promote meaningful learning, curiosity has attracted increasing attention as a powerful motivational force that stimulates exploration, questioning, and active knowledge construction. Educational research consistently demonstrates that curiosity enhances intrinsic motivation, cognitive engagement, and conceptual understanding by encouraging learners to seek explanations and investigate unfamiliar situations. Students whose curiosity is supported are more likely to persist when facing challenging tasks, ask meaningful questions, and develop deeper understanding of disciplinary concepts. Within mathematics education, curiosity is particularly valuable because it encourages learners to investigate patterns, explore multiple solution strategies, justify their thinking, and develop flexible mathematical reasoning (Mrayyan, 2016; Rahayuningsih et al., 2023). Consequently, fostering curiosity has become an important educational objective for supporting both students' immediate learning experiences and their long-term engagement with mathematics.

Mathematical curiosity has been described as students' willingness to explore mathematical ideas, understand quantitative relationships, solve unfamiliar problems, and construct new mathematical knowledge. Previous research has shown that curiosity during early childhood is positively associated with mathematics achievement and broader academic development (Shah et al., 2018). Building upon this perspective, Usluoğlu and Toptaş (2021) conceptualized mathematical curiosity through three dimensions: the desire to know the unknown, the search for novelty, and the desire for success. Rather than merely seeking correct answers, mathematically curious students actively explore alternative strategies, identify patterns, and make sense of mathematical structures. Such students also demonstrate higher levels of cognitive engagement and persistence when confronted with challenging mathematical tasks (Clarke & Roche, 2018; Skilling et al., 2021). Understanding how mathematical curiosity develops during primary education may therefore provide valuable insights into improving students' mathematical learning experiences.

Children's curiosity frequently emerges while interacting with real-life situations. Everyday experiences involving measurement, quantity, comparison, time, or spatial relationships naturally stimulate children's desire to ask questions and seek explanations. Within mathematics education, such experiences are particularly important because they provide meaningful contexts through which mathematical thinking can develop. This perspective is consistent with approaches emphasizing meaningful real-life contexts in mathematics learning (Vos, 2018; Sujatha & Vinayakan, 2023).

Although curiosity has received considerable attention in educational research, previous studies have primarily examined curiosity as a general motivational construct or investigated mathematical curiosity independently (Hsu et al., 2026). Comparatively little is known about how children's curiosity arising from everyday experiences relates to their mathematical curiosity, particularly from the perspectives of primary school students themselves. Moreover, existing mathematics education studies have largely emphasized achievement and attitudes rather than students' lived experiences (Jaen & Baccay, 2016; Peterson & Cohen, 2019). This gap suggests the need for qualitative research exploring how children describe the connections between their everyday curiosity and mathematical curiosity within authentic learning experiences.

The purpose of this study is to explore how primary school students describe the relationship between their curiosity arising from everyday experiences and their mathematical curiosity within the context of mathematics learning. Specifically, the study examines how students express different forms of curiosity, how they connect everyday experiences with mathematics, and how these experiences shape their engagement with mathematics learning. By foregrounding students' own perspectives, this study seeks to contribute to a deeper understanding of curiosity as a meaningful component of primary mathematics education.

In line with this purpose, the study seeks to answer the following research questions:

- How do primary school students describe their mathematical curiosity experiences?
- How do primary school students describe their realistic curiosity experiences related to mathematics?
- How do students relate their real-life curiosity experiences to mathematics learning?
- How do real-life mathematical situations influence students' interest and curiosity in mathematics?
- What are students' suggestions for increasing curiosity in mathematics lessons?

Method

Research Design

This study employed a qualitative research design within an interpretive research paradigm to explore how primary school students describe the relationship between curiosity arising from everyday experiences and mathematical curiosity. A qualitative approach was considered appropriate because the purpose of the study was to understand students' perspectives, meanings, and interpretations rather than to measure predetermined variables (Järvenoja & Järvelä, 2005). The interpretive paradigm enables researchers to examine participants' experiences in depth and to understand how individuals construct meaning from their lived experiences. Since the present study focused on students' own perceptions of curiosity in both everyday life and mathematics learning, this paradigm provided an appropriate framework for exploring these experiences in authentic educational contexts.

Semi-structured interviews were selected as the primary data collection method because they allow participants to describe their experiences in their own words while providing sufficient flexibility for the researcher to ask follow-up questions when clarification is needed

(Creswell, 2013; Pathak & Intratat, 2012). This method is widely recommended in educational research investigating students' perceptions, experiences, and meaning-making processes (Tran et al., 2025).

Participants

The participants consisted of sixteen primary school students aged between 9 and 10 years who were enrolled in the third and fourth grades. A purposive sampling strategy was employed to include students from different grade levels while maintaining a balanced gender distribution (Büyüköztürk, 2012). Students were selected based on their ability to express their thoughts verbally and their willingness to participate in individual interviews. The final participant group consisted of eight female and eight male students. To ensure confidentiality and protect participants' identities, pseudonyms were assigned to all students throughout the study. Descriptive information regarding the participants is presented in Table 1.

Table 1.

Descriptive data for the study group

Grade	Gender	f
3rd grade	Female	4
	Male	4
4th grade	Female	4
	Male	4
Total	16	

Data Collection Process

Data were collected through a semi-structured interview form consisting of five open-ended questions. The interview protocol was developed following an extensive review of the literature on curiosity, mathematical curiosity, and mathematics education. This process ensured consistency between the conceptual framework of the study, the research questions, and the interview protocol.

To enhance content validity, the interview questions were evaluated by one expert in mathematics education and one language expert. Based on their recommendations, minor revisions were made to improve the clarity, comprehensibility, and age appropriateness of the questions. In addition, the interview protocol was piloted to determine whether the questions were understandable for primary school students before the main data collection process.

The interview questions focused on students' mathematical curiosity, curiosity emerging from everyday experiences, the connections they established between mathematics and daily life, the factors that increased their curiosity toward mathematics, and their suggestions for promoting curiosity during mathematics lessons.

Individual face-to-face interviews were conducted in a quiet room within the school environment to ensure that students felt comfortable throughout the interview process. Each interview lasted approximately 20–30 minutes. During the interviews, students were encouraged to express their ideas freely, and additional probing questions were asked when further clarification was required.

All interviews were conducted in Turkish, the participants' native language. With participants' and parents' permission, all interviews were audio-recorded and subsequently transcribed verbatim. The quotations presented in this article were translated into English by the researchers, and particular attention was paid to preserving the original meanings of the students' responses during the translation process.

Data Analysis

The interview data were analyzed using thematic analysis following the six-phase framework proposed by Braun and Clarke (2006) and supported by their subsequent methodological work (Braun & Clarke, 2022). Thematic analysis was selected because it provides a systematic and flexible procedure for identifying, analyzing, and interpreting patterns within qualitative datasets.

The analysis proceeded through six stages: (a) familiarization with the data through repeated reading of the interview transcripts, (b) generation of initial codes from meaningful participant statements, (c) comparison and refinement of the codes, (d) organization of related codes into broader themes, (e) review of the themes in relation to the complete dataset, and (f) definition and naming of the final themes.

The coding process was conducted manually without the use of qualitative data analysis software, which is considered appropriate for qualitative studies with relatively small datasets (Braun & Clarke, 2022). Initial codes were generated through careful examination of participants' responses. The coding process was carried out collaboratively by the researcher and a second researcher with expertise in mathematics education and qualitative research. Coding decisions were discussed throughout the analysis process until consensus was reached regarding the interpretation of the data. Finally, the themes were developed by considering both the research questions and the relevant literature to ensure that they accurately represented the patterns emerging from the participants' experiences.

Trustworthiness

The trustworthiness of the study was established by considering the criteria of credibility, transferability, dependability, and confirmability. Credibility was enhanced through researcher triangulation, whereby the researcher and a second researcher collaboratively reviewed the coding process and discussed coding decisions until consensus was achieved. Transferability was supported by providing detailed descriptions of the participants, research context, and data collection procedures, enabling readers to determine the applicability of the findings to similar contexts. Dependability was ensured by documenting each stage of the research process and describing the data analysis procedures in detail. Confirmability was strengthened through collaborative examination of the codes and themes and by supporting the findings with direct quotations from participants. Collectively, these procedures contributed to the rigor and trustworthiness of the qualitative research process.

Ethical Considerations

Ethical approval was obtained from the relevant Ethics Committee before the commencement of the study (Approval No. 343961). Written informed consent was obtained from parents or legal guardians, and verbal assent was obtained from all participating students prior to data collection. Participation was entirely voluntary, and students were informed that they could withdraw from the study at any stage without any consequences.

To protect participants' privacy, pseudonyms were used throughout the study, and all collected data were treated confidentially.

Findings

In this section, the answers given by the students to the interview questions are presented in a table by combining them with common codes and themes.

Findings Regarding the First Sub-Problem

The themes and codes related to the answers given to the question "What are the things that interest you the most in mathematics class? What do you want to learn?" directed to the students in the research are given in Table 2.

Table 2.

Answers to the most curious questions in mathematics class

Sample student statement	Code	Theme
I wonder how to do quick calculations.	Process curiosity	Awakening of curiosity
I wonder how you solve problems.	Solution strategy curiosity	Awakening of curiosity
I wonder about new topics related to mathematics.	Desire to learn new topics	Awakening of curiosity

Table 2 presents the themes and codes derived from students' responses to the question. The findings indicate that students' mathematical curiosity was primarily reflected in three areas: improving operational skills, learning different solution strategies, and exploring new mathematical topics. Many students expressed a desire to perform mathematical operations more quickly and accurately, while others emphasized their interest in discovering alternative ways to solve problems. Several students also reported that learning new mathematical concepts introduced by the teacher attracted their attention and motivated them to learn more. The following quotations illustrate these findings:

Student 2: "*I like doing math. I enjoy calculating operations quickly when learning math.*"

Student 6: "*I am the fastest at performing mathematical operations in my class. And I* *really enjoy it. I like finding quick solutions to math problems.*"

Student 11: "*When our teacher teaches something new about mathematics, it catches my attention. I become curious and want to learn the subject immediately.*"

Overall, the findings suggest that students' mathematical curiosity is associated with developing mathematical competence, exploring different solution methods, and learning unfamiliar mathematical content.

Findings Regarding the Second Sub-Problem

The themes and codes related to the answers given to the question "Did you ever think, "Why are we learning this?" or "What will it do us good in real life?" (If so, what topics did you think about?)" directed to the students in the research are given in Table 3.

Table 3.

Answers regarding the benefits of mathematics lessons

Sample student statement	Code	Theme
Sometimes I don't understand why we learn math.	Questioning the purpose of learning	Relation to real life
I think it's useful when spending time with my family and friends.	Discovering examples from life	Relation to real life
I think about it but some topics seem unnecessary.	Doubt about learning	Relation to real life

Table 3 presents students' views regarding the purpose of learning mathematics and its relationship with everyday life. The findings reveal that many students questioned why they learned certain mathematical topics and whether they would use this knowledge in their daily lives. While some students found it difficult to relate mathematics to real-life situations, others provided examples demonstrating how mathematics is used in activities such as shopping, managing money, cooking, and playing games with friends. The following quotations exemplify these perspectives:

Student 9: "*Yes, I sometimes question it. I especially ask where we will encounter difficult mathematical problems in our real lives.*"

Student 16: "*I think mathematics is very useful in our daily lives. My father calculates money and bills using* *mathematics. My mother measures food using mathematics. My sister says that if she succeeds in math class, she can do whatever job she wants. I also use numbers when playing games with my friends.*"

These findings indicate that students differ in how they perceive the usefulness of mathematics; however, many were able to identify meaningful connections between mathematics and their everyday experiences.

Findings Regarding the Third Sub-Problem

The themes and codes related to the answers given to the question "When you wonder about something in real life (at home, on the street, in the market, etc.), can you relate it to mathematics? (For example, calculation, measurement, comparison)" asked to the students in the study are given in Table 4.

Table 4.

Answers regarding the relationship between real life and mathematics

Sample student statement	Code	Theme
We use measurements when eating or shopping with my family	Measuring in daily life	Relation to real life
When playing games with my friends/siblings, we calculate points etc.	Mathematics with games	Relation to real life
I calculate time in my daily activities.	Measuring time	Relation to real life

Table 4 presents students' responses regarding how they relate situations encountered in everyday life to mathematics. Students frequently associated mathematics with daily activities such as shopping, measuring, telling time, handling money, and playing games. Their responses demonstrated that mathematical thinking naturally occurs while solving practical problems encountered in everyday situations. Representative quotations are presented below:

Student 7: "*I think we use mathematics everywhere. We need mathematics when shopping with my family and when handling money.*"

Student 13: "*I can't play games with my friends without math. I think my life would* *be difficult without knowing numbers. We need to know math even to tell the time.*"

Overall, the findings show that students frequently recognize mathematics as a practical part of everyday life and readily connect mathematical ideas with their daily experiences.

Findings Regarding the Fourth Sub-Problem

The themes and codes related to the responses to the question "Does dealing with problems taken from real life (for example, shopping, traveling, time planning) make mathematics more interesting for you? Why?" asked to the students in the study are given in Table 5.

Table 5.

Answers regarding why real life problems make mathematics interesting

Sample student statement	Code	Theme
Yes, because it is easier to combine real things with math.	Meaningfulness of real life	Relation to real life
It attracts my attention and I enjoy it more.	Interest and motivation	Awakening of curiosity
I am more curious about real life math topics.	Increased curiosity	Awakening of curiosity

Table 5 summarizes students' views on whether real-life problems make mathematics more interesting. Most students reported that mathematics became easier to understand and more enjoyable when lessons included examples from everyday life. They explained that contextualized mathematical problems helped them understand mathematical concepts more clearly and increased their interest in learning. The following quotations illustrate these views:

Student 3: "*Of course, learning mathematics is great, but discovering mathematics in our real lives is even better. Because it becomes more meaningful*."

Student 15: "*I enjoy learning math at school. This way I can help my family with math at home. This makes me happy.*"

Student 6: "*I get excited when our teacher says we will learn a new math topic. Our teacher chooses math problems from real life.*"

These findings suggest that students perceive real-life contexts as meaningful learning opportunities that increase their interest and engagement in mathematics lessons.

Findings Regarding the Fifth Sub-Problem

The themes and codes related to the responses to the question "What would be better in mathematics lessons to stimulate their curiosity? (For example,interms of teachers, activities, questions, games, etc.)" posed to the students in the study are given in Table 6.

Table 6.

Answers on how to increase curiosity in math class

Sample student statement	Code	Theme
The teacher should ask me to ask more questions on the topic.	Opportunity to ask questions	Supporting curiosity
There should be more group work for games and activities in classes.	Activity and peer learning	Supporting curiosity
Classes should be more fun.	Fun learning	Supporting curiosity

Table 6 presents students' suggestions for increasing curiosity during mathematics lessons. The findings indicate that students preferred interactive learning environments that encouraged active participation, questioning, collaboration, and game-based activities. They emphasized the importance of teachers' instructional practices in creating engaging mathematics lessons and suggested that opportunities for discussion and group work would make learning more interesting. The following quotations illustrate these opinions:

Student 14: "*Maybe if our teacher asked more math problems, we would be more curious and successful in math.*"

Student 10: "*Perhaps our curiosity would develop if we did group work in class or played more games in math class.*"

Student 1: "*I much prefer math lessons learned through physical or digital games. The lessons using games like these could be increased.*"

Overall, the findings indicate that students believe curiosity can be supported through student-centered instructional practices that promote interaction, collaboration, and meaningful participation in mathematics lessons.

Discussion and Conclusion

The present studies explored how primary school students describe mathematical curiosity, curiosity arising from everyday experiences, and the connections they perceive between these two forms of curiosity. Overall, the findings indicate that students frequently associated their interest in mathematics with opportunities to solve problems, learn new topics, and relate mathematical ideas to situations encountered in everyday life. These findings support previous studies suggesting that mathematics learning becomes more engaging when classroom experiences are connected with authentic real-life contexts (Brown & Campione, 2013; Sujatha & Vinayakan, 2023).

The first finding showed that students' mathematical curiosity was primarily associated with improving operational skills, learning different solution strategies, and exploring unfamiliar mathematical topics. Students frequently described curiosity as a desire to perform calculations more efficiently, discover alternative solution methods, and learn new mathematical concepts. This finding is consistent with previous studies suggesting that curiosity emerges when learners encounter situations that challenge their existing knowledge and encourage further exploration (Pluck & Johnson, 2011; Ainley, 2019). Rather than reflecting only an interest in novelty, students' responses suggest that curiosity is also associated with the desire to improve mathematical competence.

Another important finding was that many students questioned the purpose of learning mathematics and its relevance to everyday life. While some students experienced difficulty identifying practical applications of mathematical knowledge, others provided examples from shopping, family life, and daily routines. These findings are consistent with previous research emphasizing that curiosity is strengthened when learners perceive knowledge as meaningful and relevant to their own experiences (Altay et al., 2017; Peterson & Cohen, 2019). From this perspective, students' questions about the usefulness of mathematics may reflect attempts to make sense of what they learn rather than a lack of interest in mathematics itself.

The findings further demonstrated that students frequently connected mathematics with everyday experiences, including shopping, measuring, telling time, handling money, and playing games. These examples indicate that students recognize mathematical ideas in a variety of real-life situations. This finding supports previous studies highlighting the importance of authentic contexts in making mathematics learning more meaningful (Palm, 2008; Dahiya, 2014; Sekarini & Arty, 2019). Rather than viewing everyday experiences and mathematics as separate domains, many students described natural connections between them.

Another notable finding was that students considered mathematics lessons more interesting when real-life problems were incorporated into classroom activities. They reported that contextualized tasks made mathematical concepts easier to understand and increased their interest in learning. This finding is consistent with previous research showing that authentic problem situations can enhance students' motivation, engagement, and interest in mathematics (Arnone et al., 2011; Oudeyer et al., 2016; Vos, 2018; Yu & Singh, 2018; Sujatha & Vinayakan, 2023; Hsu et al., 2026). Students' emphasis on enjoyment also suggests that positive learning experiences may encourage greater interest in mathematical activities.

The final finding highlighted the importance students placed on interactive classroom environments. Students emphasized that asking questions, participating in classroom activities, collaborating with peers, and learning through games increased their interest in mathematics. These findings support previous research emphasizing the role of student-centered instructional practices in promoting curiosity (Roth, 2017). They also suggest that classroom environments encouraging active participation may provide opportunities for students to express and develop their curiosity.

Taken together, the findings indicate that students perceive meaningful connections between their everyday experiences and mathematics learning. Rather than suggesting that one form of curiosity develops into another, the findings show that students frequently describe these experiences as interconnected. This perspective highlights the importance of designing mathematics learning environments that help students recognize mathematical ideas within meaningful real-life contexts.

The findings have several implications for mathematics education. First, mathematics lessons may benefit from incorporating authentic real-life situations that enable students to recognize the relevance of mathematical knowledge beyond the classroom. Second, teachers can encourage curiosity by creating classroom environments in which students feel comfortable asking questions, discussing alternative ideas, and exploring multiple solution strategies. Third, the use of games, collaborative activities, and inquiry-oriented tasks may further support students' active engagement during mathematics learning.

This study also contributes to the existing literature on curiosity. Previous research has generally examined curiosity either as a general psychological construct (Silvia, 2008; Kurtbaş, 2011; Bacanlı & Türk Kurtça, 2020) or within science education (Ball, 2013; Dann, 2013; Kahraman & Ceylan, 2015). By focusing on primary school students' descriptions of mathematical curiosity and curiosity arising from everyday experiences, the present study extends this literature within the context of mathematics education. Rather than proposing a new theoretical construct, the findings provide qualitative evidence that students themselves perceive meaningful connections between curiosity experienced in everyday life and curiosity experienced while learning mathematics. These findings may inform future studies examining curiosity in mathematics education from students' perspectives.

Limitations and Future Research

This study has several limitations that should be considered when interpreting the findings. First, the study involved a relatively small sample of primary school students, which limits the transferability of the findings to other educational contexts. Future studies may include larger and more diverse participant groups to examine whether similar patterns emerge across different settings. Second, the findings were based on students' self-reported experiences obtained through interviews. Future research may complement these findings by incorporating classroom observations or other qualitative data sources to examine how curiosity is expressed during mathematics learning. Finally, because the present study adopted a qualitative research design, future studies employing mixed-methods or longitudinal approaches may provide a broader understanding of how students' curiosity develops over time and how different instructional practices influence curiosity in mathematics education.

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