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USING MATHEMATICAL LANGUAGE TO FOSTER MATHEMATICAL CULTURE

Ngoc Bich Tran[1], Thanh Hoa Diep[2]

[1]Thai Nguyen University of Education, Vietnam
[2]Tran Hung Dao Primary School, Quang Ninh, Vietnam

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ABSTRACT

Mathematical language is not only a tool of thinking and a means of mathematical communication but is also utilized in mathematics teaching to develop students' mathematical culture. This paper provides an overview of mathematical language, mathematical culture, and the role of mathematical language in teaching mathematics to contribute to the development of mathematical culture among students. Through mathematics teaching, the use of mathematical language plays a vital role in fostering mathematical culture in learners.

KEYWORDS: Mathematical culture, mathematical language, primary mathematics.

INTRODUCTION

Language is an indispensable tool for maintaining and developing culture because it serves as a medium for communication, conveying thoughts, and preserving knowledge and cultural values across generations. Language is not only a vehicle for information exchange but also shapes human personality and reflects the identity of a community.

Mathematics has long been recognized as a subject that helps cultivate logical reasoning, creativity, and the ability to make rational and coherent arguments. In mathematics teaching, besides equipping students with mathematical knowledge and skills, it is essential to help them perceive the value of mathematical culture. Therefore, it is necessary to integrate the understanding of mathematical cultural values into mathematics instruction.

CONTENT

1. Overview of Mathematical Language and Mathematical Culture

1.1. Mathematical Language

Mathematical language includes mathematical terms, symbols, images, diagrams, and models used to represent mathematical information.

- Mathematical language as a tool for thinking and communication:

Mathematical language plays a particularly important role because it not only serves as a means for students to access new knowledge but also as a tool to develop logical reasoning and precise

expression. It is characterized by conciseness, coherence, and consistency. Symbols such as "+", "−", "×", "÷", and parentheses allow students to represent calculations efficiently while fostering scientific working habits and analytical thinking. For example, when a student writes "6 × 4 = 24," they are not merely performing a multiplication operation but are also expressing a real-world situation symbolically. In this way, students begin to form abstract thinking and the ability to shift flexibly between verbal and symbolic representations.

Mathematical language significantly influences students' learning outcomes. Mastery of mathematical language directly affects students' comprehension, problem-solving, and solution presentation. When students understand and use symbols, operations, diagrams, and expressions correctly, they minimize mistakes and achieve greater accuracy in tests and daily learning activities.

Conversely, when students struggle to use symbols or fail to translate real-world contexts into mathematical language, they are more prone to errors, reducing the quality of their work and overall performance. Proficiency in mathematical language also enables students to solve problems more quickly and present their reasoning more systematically.

Furthermore, fluency in mathematical language fosters students' confidence, encouraging active participation in group activities and learning competitions. It can be affirmed that mastering mathematical language is the key for students not only to gain deep understanding but also to achieve sustainable success in primary mathematics learning.

- Mathematical language contributes to the development of mathematical competence:

The use of mathematical language helps students engage more effectively in problem-solving, reasoning, and modeling, thereby strengthening their mathematical competencies.

- Mathematical language in cultivating learning qualities and mathematical communication:

Beyond serving as a tool for thinking and problem-solving, mathematical language plays a crucial role in shaping students' learning dispositions and competencies. When students accurately write symbols, perform calculations, or present clear solutions, they gradually develop habits of carefulness, precision, and discipline.

In addition, frequent use of mathematical language in interactions with teachers and peers helps students express ideas clearly, logically, and persuasively.

1.2. Mathematical Culture

Mathematical culture may seem unfamiliar to many people; when viewed from a cultural perspective, it emphasizes the cultural value of mathematics. In a narrow sense, "mathematical culture includes the ideas, spirit, methods, viewpoints, and language of mathematics" [3]. In a broader sense, "mathematical culture refers to the relationship between the history of mathematics, mathematicians, the beauty of mathematics, mathematics education, cultural elements in the development of mathematics, and the connection between mathematics and diverse human cultures" [3].

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According to Trần Kiều, "Mathematical culture is a set of mathematical knowledge and skills, mathematical ways of thinking, and the ability to use mathematics in a culturally appropriate manner to adapt to various life situations when necessary" [1].

Nguyễn Cảnh Toàn defines "mathematical culture as a system of mental and personal qualities absorbed through learning and practicing mathematics, which remain even after specific mathematical knowledge has been forgotten" [2].

The characteristics of mathematical culture are the system of basic, core, and standard mathematical knowledge and skills associated with real life; it is a typical mathematical thinking method: Demonstrating rigor, accuracy, and logic; expressive language (spoken and written language), presenting problems clearly, concisely, fully, and easily understood; it is the qualities and ethics of people through learning and doing math: Careful, persistent, overcoming difficulties; honest, objective, dialectical, looking at problems comprehensively, behaving and solving situations and work in real life in an optimal way.

Mathematical culture represents the ultimate goal of mathematics education—fulfilling the broader educational aim of *"teaching knowledge to educate people."* Mathematical culture cannot be separated from local culture or regional characteristics. The value of mathematical culture is embedded within local and national cultural values. Therefore, in mathematics teaching, teachers should pay attention to the distinctive features of mathematical culture.

2. Using Mathematical Language in Mathematics Teaching to Foster Mathematical Culture

Firstly, in mathematics instruction, students should recognize that mathematics originates from real life and can be applied to solve real-world problems.

For example, a teacher may present the following contextual problem: *"*Mother goes to the market to buy 2 yến (20 kilograms) of rice. Each kilogram of rice costs 17,000 VND. She gives the vendor a 500,000 VND bill. How much change will she receive?"

Analysis: This problem is closely connected to students' daily lives—specifically, the common activity of buying and selling goods. To solve it, students must understand the relationship between kilograms and yến and use mathematical language to express their reasoning clearly.

Organize students to work individually to read the math problem and answer the questions:

- What information does the problem provide? (Mother buys 2 yến of rice; each kilogram costs 17,000 VND; she pays with a 500,000 VND bill.)
- What does the problem ask for? (How much change does the vendor return?)

Students underline the key mathematical terms in the problem and present their written solution:

Solution:

2 yến = 20 kilograms

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Money spent on 20 kilograms of rice:
17,000 × 20 = 340,000 (VND)
Money returned by the vendor:
500,000 − 340,000 = 160,000 (VND)
Answer: 160,000 VND

Class discussion follows, where representatives present their solutions and explain their reasoning. Peers provide comments and questions, and the teacher offers feedback and confirms the correct answer.

Secondly, through mathematics teaching, teachers can integrate real-life situations into mathematical problems to nurture students' moral values, empathy, and sense of community.

For example, consider the problem: *"*Huyền has 45 notebooks. She gives some to her classmates in a flood-affected area and has 17 lefts. How many notebooks did she give away?"

Analysis: Beyond practicing subtraction, this problem teaches the moral lesson of compassion—reflecting the Vietnamese tradition of "the good leaves protect the worn-out leaves." It helps students develop kindness and social responsibility.
Organize students to work in pairs. Ask them to read the problem carefully, then discuss and answer the following questions based on the given and required information.
What does the problem tell you? (Huyen has 45 notebooks. She gives some notebooks to students in the flood area. After that, she has 17 notebooks left.)
What does the problem ask? (It asks: How many notebooks has Huyen given away?)
How do you find the number of notebooks Huyen has given away? (Perform subtraction: 45 – 17)
Organize students to complete the exercise.

Solution:
The number of notebooks Huyen has given away is:
45 – 17 = 28 (books)
Answer: 28 notebooks.

Organize students to work in the whole class: Student representatives present their work. Students comment and ask questions to their friends. Teachers comment, evaluate and finalize the exercise results.
Another example: "Hà has 5 flowers, and Mai has 4. Together, they make a bouquet to present to their teacher on Vietnamese Teachers' Day (November 20th). How many flowers are in the bouquet?"

This problem not only introduces students to a national holiday but also reinforces the cultural value of "respecting teachers and honoring education". While urban students may already be familiar with such holidays, students in remote may not; thus, integrating cultural context in mathematics helps

bridge that gap.

Thirdly, primary mathematics teaching often relies on visual aids to form new concepts. However, teachers must select images that are locally relevant and familiar to students' everyday lives. For instance, when teaching the unit of length "kilometer," teachers can use different illustrations depending on students' contexts. For urban students, the teacher might use an image of a 1-kilometer highway or boulevard. For rural or mountainous students, the teacher might use local examples such as "the distance from Hà's house to school is 1 km" or "the distance from the school to the commune office is 1 km."

When assigning practical exercises, teachers should also consider local realities. For example, when reviewing the unit "meter" and measuring practice, rural students might measure the length and width of their house yard or the commune's courtyard, while urban students might measure the sidewalk or hallway in front of their house.

In teaching problem solving practice, teachers need to pay attention to the language problem expressed in the problem so that it is close to real life so that students can easily visualize and imagine the context of the problem, from which students will solve the problem more easily. For example, a problem like: "The distance from home to school is 660 meters. The distance from home to the supermarket is 50 meters shorter. How long is the distance from home to the supermarket?" — is suitable for urban students. For students in mountainous regions, the problem can be reworded as: "The distance from home to school is 660 meters. The distance from home to the commune office is 50 meters shorter. How long is the distance from home to the commune office?"

Another problem is *"*Each square tile has a side length of 40 cm. Find the perimeter of the rectangle formed by 3 such tiles". In this problem, for urban students, it can be understood that these are ceramic tiles used to pave floors or walls, but for ethnic minority students in mountainous areas who only live in stilt houses, it is difficult to visualize these ceramic tiles. Therefore, teachers can use another object to change the context of the problem to make it closer to students without changing the mathematical content. For example, the problem can be re-stated as follows: "each square brocade scarf has a side of 40cm. Calculate the perimeter of a rectangle made of 3 such scarves".

Thus, with the same mathematical information, depending on the local characteristics, that mathematical information is attached to different contexts. Students in favorable areas will calculate the perimeter of a rectangle made of 3 square ceramic tiles with sides of 40 cm. Students in mountainous areas will calculate the perimeter of a rectangle made of 3 square brocade scarves with sides of 40 cm.

Students can solve that problem as follows:

Solution

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The length of the rectangle made of 3 brocade scarves is:

$40 \times 3 = 120$ (cm)

The perimeter of that rectangle is:

$(120 + 40) \times 2 = 320$ (cm)

Answer: 320 cm.

Moreover, mathematics teaching should not only focus on appropriate, relatable language but also help students connect mathematics with real life through the use of mathematical language. In particular, when teaching about Vietnamese currency, teachers need to educate students about the value of money.

Primary school students are quite proficient in calculating addition, subtraction, multiplication, and division with natural numbers; are familiar with denominations of money and know how to read bills, so it is necessary to educate students to know the value of money, appreciate labor, and have a sense of saving from within the family, for example: knowing how to turn off the faucet when washing hands, turn off the lights when leaving the room or the house, having requirements such as shopping for clothes, toys, food, etc. must be appropriate, not wasteful...

To achieve this, teachers need to design math problems related to money using language that is close to the daily spending habits of each student's family. For example, consider the following problem:

"A family spends their monthly salary as follows: $\frac{3}{5}$ of the salary on food and children's education, $\frac{1}{5}$ of the salary on rent and other expenses, the rest is saved.

a. How many percent of the salary does the family save each month?

b. If the monthly salary is 20,000,000 VND, how much money does the family save each month?"

Teachers can also create practical situations that allow students to simulate reasonable spending. For example:

"Your mother gives you a 100,000 VND bill. Use this money to buy a fountain pen, a ruler, a pencil, and some notebooks so that you spend exactly the amount given. The prices are: fountain pen – 15,000 VND each, pencil – 3,000 VND each, ruler – 2,000 VND each, notebook – 8,000 VND each. Tell your mother how many of each item you can buy."

The combined use of mathematical language and Vietnamese language helps educate students about frugality, sharing, helping others, and appreciating the value of money. For instance:

"Huan saved 185,000 VND. He donated 150,000 VND to the 'Poor Students Overcoming Difficulties' Fund. How much money does Huan have left?" or "Toan saved 120,000 VND. He bought a school bag for 83,000 VND. How much money does Toan have left?"

Such problems help students learn how to use money for meaningful purposes, avoid wasteful spending, and develop a sense of saving and sharing.

Furthermore, through mathematics teaching, teachers should help students recognize the vital applications of mathematics in scientific and technological development, as well as in economic and social growth and daily life. For example, teachers can organize math games in which students compete

to list real-life applications of numbers. From their life experience, students may see that natural numbers are used in vehicle license plates, phone numbers, room numbers, house numbers, elevator floors, money denominations, and shopping receipts. Decimal numbers are used in measurement units such as the length, width, and height of a house, or in buying food items such as fish or meat, etc.

CONCLUSION

Using mathematical language accurately and rigorously in mathematics instruction not only contributes to the development of thinking and Vietnamese language skills but also helps shape students' mathematical culture. Through learning mathematics, students come to understand the value of mathematical culture and realize that mathematics is closely connected to real life — it originates from reality and serves reality.

REFERENCES

1. Tran, K. (1999). *School Mathematics and the Requirement of Developing Cultural Capital.* Vietnam Institute of Educational Sciences.
2. Nguyen, C. T. (2009). *How to Learn Mathematics Effectively?* Education Publishing House, Hanoi.
3. Jin, Y. (2013). *Impact of Mathematical Culture on the Quality of College Students. Cross-Cultural Communication,* 9(6), 99–102. https://doi.org/10.3968/j.ccc.1923670020130906.Z4015