

Orientation of Integrated Teaching in Grade 5 Mathematics in Vietnam

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ABSTRACT: Integrated teaching in Mathematics is the process of linking, connecting, and perfecting the system of mathematical science knowledge within mathematics or with other sciences. The orientation of integrated teaching in Grade 5 Mathematics in Vietnam contributes to the formation of learning strategies for students and creates opportunities for them to apply mathematical knowledge in real-life situations. In Mathematics teaching, integration can be implemented through intra-disciplinary integration (integration within a knowledge strand or among different strands in Mathematics), integration of mathematical content with real-life contexts, and integration through practical activities and experiential learning in Mathematics.

KEYWORDS: Teaching, integration, Mathematics, primary school students

1. INTRODUCTION

The goal of Mathematics education is to help students recognize the role of Mathematics in real-life contexts. Students should be able to express ideas accurately and apply mathematical knowledge and skills in daily life. Mathematical knowledge and skills need to be embedded and integrated into other subjects, as well as practiced and applied in real situations. Therefore, teaching Mathematics to Grade 5 students in the orientation of integration is essential.

2. AN OVERVIEW OF INTEGRATED TEACHING

2.1. Concepts of Integration and Integrated Teaching

2.1.1. Concept of Integration

According to the Vietnamese Dictionary, *integration* is understood as “assembling and connecting components of a system to create a synchronized system” [3].

According to Đỗ Đức Thái and Đỗ Tiến Đạt, *integration* “is an aspect of the developmental process, relating to the synthesis of previously existing individual components and factors into a unified whole” [4].

We understand that *integration is the process of connecting individual components during development into a unified entity.*

2.1.2. Concept of Integrated Teaching

According to Đỗ Ngọc Thống: “*Integrated teaching is the organization and guidance that enables students to mobilize and synthesize knowledge and skills from different fields to solve learning tasks; thereby forming new knowledge and skills, and developing essential competencies, especially problem-solving skills in learning and real-life situations*” [5].

According to Đinh Quang Báo: “*Integrated teaching is a teaching orientation in which teachers organize and guide students to synthesize knowledge and skills from various fields to solve learning tasks; through this, students form new knowledge and skills, and develop essential competencies, especially problem-solving skills in both learning and real-life situations*” [2].

We understand that *integrated teaching* is a teaching orientation that helps students develop the ability to mobilize and synthesize knowledge and skills from various fields to effectively solve problems in both learning and real life. This process takes place during knowledge acquisition and skill training, enabling the development of essential competencies, especially problem-solving. Integration is reflected in the mobilization, combination, and interconnection of related elements from multiple fields to effectively address a problem, often achieving multiple objectives simultaneously [1].

2.2. Nature of Integrated Teaching

According to Đỗ Đức Thái and Đỗ Tiến Đạt (2016), the nature of integrated teaching includes:

- **Firstly**, forming in students a holistic view of the surrounding world as well as understanding the relationships among natural and social phenomena in a comprehensive manner (here, integration is considered an *educational goal*).

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- **Secondly**, it is the search for a common foundation to converge different subject matters (here, integration is considered an *educational tool or means*).
- **Thirdly**, it contributes to the activation of learning activities and the development of intellectual capacities in students. Integrated teaching is also the shortest and most effective way to form and develop students' competencies, especially the ability to solve real-life problems.

2.3. Forms of Integrated Teaching

- Intra-disciplinary integration: This involves systematizing knowledge, where separate pieces of knowledge are connected and organized in different ways to form knowledge blocks. Through this, the main ideas of a subject or the internal structural rules of its content are clarified.
- Multidisciplinary integration: Subjects are linked together within common topics or issues. When studying or researching a problem, students approach it from different subjects, and sometimes a single issue is taught simultaneously in multiple subjects. This allows students to solve problems based on knowledge acquired from different disciplines, thereby creating connections across the curriculum.
- Interdisciplinary integration: Subjects are combined when they share common themes, issues, concepts, or rules. Interdisciplinary knowledge and skills are emphasized across subjects rather than within each individual subject. Therefore, students can mobilize knowledge from various disciplines to address a given problem.
- Transdisciplinary integration: This approach does not begin with subjects or concepts and rules, but with real-life contexts and students' interests. Knowledge from two or more subjects is shaped in connection with familiar real-life situations and students' needs, thereby contributing to the development of essential life skills.

3. ORIENTATION OF INTEGRATED TEACHING IN GRADE 5 MATHEMATICS

3.1. Integration of Content within the Same Knowledge Strand

Example. Integration of content on calculating the lateral surface area, total surface area, and volume of a rectangular prism.

Students are asked to bring to class rectangular-shaped boxes, such as the following packages:



Students work individually to measure the length, width, and height of the rectangular boxes they bring.

For instance, a student measures a chalk box and finds that its length is 5.5 cm, width is 2 cm, and height is 8 cm.

- Students share the measurement process and results with their classmates.
- Students apply formulas for calculating the lateral surface area, total surface area, and volume of a rectangular prism to determine these values for the boxes they have brought.

From the given measurements, the student calculates as follows:

Lateral surface area of the chalk box:

$$(5.5 + 2) \times 2 \times 8 = 120 \text{ (cm}^2\text{)}$$

Area of the two bases of the chalk box:

$$5.5 \times 2 \times 2 = 22 \text{ (cm}^2\text{)}$$

Total surface area of the chalk box:

$$120 + 22 = 144 \text{ (cm}^2\text{)}$$

Volume of the chalk box:

$$5.5 \times 2 \times 8 = 88 \text{ (cm}^3\text{)}$$

Answer: 120 cm²; 144 cm²; 88 cm³.

Students then present their results to the class and explain their solution process.

3.2. Integration across Knowledge Strands in Mathematics

The primary mathematics curriculum consists of three main strands: *Numbers and Operations*, *Geometry and Measurement*, and *Statistics and Probability*. In Grade 5 Mathematics instruction, emphasis should be placed on intra-disciplinary integration, particularly the integration across these strands.

Example. Integration between the strands of *Numbers and Operations* and *Geometry and Measurement*.

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Students are asked to read and rewrite information with measurements expressed in meters and tons.

Male giraffes have an average height ranging from 480 cm to 550 cm, while female giraffes are shorter. The giraffe's neck measures about 180 cm long, and its legs are of similar length. The tallest recorded giraffe reached 587 cm. A male giraffe can weigh up to 1,300 kg, while a female giraffe weighs about 828 kg. The heaviest recorded giraffe weighed up to 2,000 kg. A newborn giraffe is about 180 cm to 200 cm tall and weighs between 50 kg and 68 kg.

Analysis: When solving this task, students are introduced to real-world information. At the same time, they apply measurement knowledge to convert values into decimal numbers. Students practice reading and writing decimals as measurement units. While solving, they flexibly combine their understanding of decimals and measurement to perform conversions.

Students may rewrite the information as follows:

Male giraffes have an average height ranging from 4.8 m to 5.5 m, while female giraffes are shorter. The giraffe's neck measures about 1.8 m long, and its legs are of similar length. The tallest recorded giraffe reached 5.87 m.

A male giraffe can weigh up to 1.3 tons, while a female giraffe weighs about 0.828 tons. The heaviest recorded giraffe weighed up to 2 tons.

A newborn giraffe is about 1.8 m to 2 m tall and weighs between 0.05 tons and 0.068 tons.

3.3. Integrating Mathematical Content with Real-life Contexts

Designing introductory situations, application tasks, or practice exercises with mathematical content connected to real-life situations.

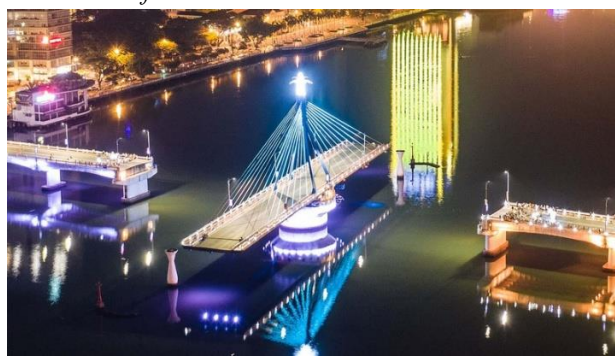
Example 1. Designing an application activity linked to real-life contexts when teaching the topic “Expressing measurements in decimal form.”

Read the following information and express the measurements in decimal form:



Dragon Bridge – Da Nang [6]

The Dragon Bridge with its fire-breathing design is considered one of Da Nang's symbolic architectural works. The Dragon Bridge was completed in 2013 with a total length of 666 meters.



Han River Bridge – Da Nang [6]

The Han River Bridge in Da Nang is the only swing bridge in Vietnam to date. The bridge was completed in 1998 with a length of nearly 500 meters.

Analysis: Da Nang is often referred to as the “city of bridges.” The given information aims to introduce students to a well-known landmark. Through this, the lesson integrates education on patriotism and love for one's homeland. The teacher can also incorporate geographical knowledge by introducing students to the location and scenic attractions of Da Nang.

Suggested teaching activity design:

Individual activity: Students read the information and solve the given problem independently.

Pair work: Students share the information they have read and their solutions with their partners.

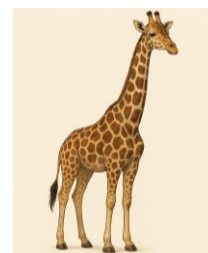
Whole-class activity: Representatives present their answers and explain their solutions to the class.

Teacher confirmation: The teacher validates the results of the exercise:

- The Dragon Bridge in Da Nang is approximately **0.666 km** long.
- The Han River Bridge in Da Nang is approximately **0.5 km** long.

At this stage, the teacher can integrate additional content about the geography and tourist attractions of Da Nang. The teacher may also ask: “Has any student in our class ever visited Da Nang with your family? Could you share your experiences from that trip?”

Example 2. Designing an introductory situation based on real-life context when teaching the topic “Rounding decimals to the nearest whole number.”



Giraffe

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Situation: Two students are discussing the distance from their homes to school.



Mai: My house is about 2.2km from school.

Huy: My house is about 2.7km from school.

Teacher: Mai's house is about 2km from school, Huy's house is about 3km from school.

Robot: Do you know why the teacher can say that?

Analysis: The situation describes two students talking about the daily distance they travel to school. This context is familiar and meaningful to students, as it relates to their everyday experiences. Students also learn to estimate and round distances in kilometers.

Suggested teaching activity design:

- Individual activity: Students read the situation silently.
- Group activity: Students role-play the conversation.
- Whole-class activity: Representatives from each group act out the role-play in front of the class.

Sample dialogue:

Mai: My house is 2.2 km away from school.

Huy: My house is 2.7 km away from school.

Teacher: Mai's house is about 2 km from school. Huy's house is about 3 km from school.

Robot: Do you know why the teacher said that?

After the robot's question, the teacher makes the connection: "To answer the robot's question, let's begin today's lesson: *Rounding decimals to the nearest whole number.*"

3.4. Integrating Mathematical Content through Practice and Experiential Activities

Design practice and experiential activities in an integrated manner. These activities should include "practicing data collection, analysis, and representation of statistical data" connected to social development issues, financial and economic education, climate change, STEM, STEAM, etc.

Example 1. Design a hands-on activity and experience making your own house.

Activity 1. Read the following information and answer the questions:

The Resettlement Area of Lang Nu (Lao Cai Province) was built with 40 houses, each having an area of 96 m². The houses are designed in the traditional stilt-house style of the Tay ethnic group.

In the center of the new resettlement area, there is a combined primary-kindergarten school with an area of 200 m², and a community house with an area of about 300 m².



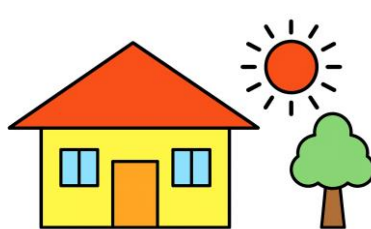
Image of the Lang Nu Resettlement Area

Question:

- Each house has an area of 96 m². What is the total area of 40 houses?
- What is the approximate total area of the combined primary-kindergarten school and the community house?

Activity 2. Propose ideas and build a small house model

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Suggestions: Use available materials such as cardboard, foam sheets, glue, staplers, or glue guns to make a house according to your idea, or design it based on the resettlement stilt houses of Lang Nu villagers.

Group activity: propose criteria and draw a design for the house according to your idea.

Suggested criteria may include:

- The house is designed on an area of 40 m^2 .
- The house has a roof, walls, and a foundation.
- The house is designed to be sturdy with a reasonable structure. ...

Activity 3. Exhibit and present the product

When presenting the product, students may follow these suggestions:

- The perimeter and area of the house.
- The materials used to make the house.
- The shape of the roof, foundation, and walls.
- The area of the roof.
- The interesting features of the group's house design.
- Which subjects did you apply knowledge from when making this house?

Activity 4. Evaluate the product

Example 2. Calculating the Price of the Grade 5 Textbook Set for This Academic Year and the Next

Activity 1. Recording the Prices of Grade 5 Textbooks

Investigate and record the price of each Grade 5 textbook for this academic year in the table below:

No.	Title of the Book	Price (VND)
1	Math Textbooks	
2	Vietnamese Textbooks	
...		
...		

Questions:

- How much money does Mai need to buy the Grade 5 Mathematics and Vietnamese textbooks?
- How much money does Nam spend if he buys the entire set of Grade 5 textbooks? Knowing that if the whole set is purchased, a 3% discount is applied.

Activity 2. Calculating the Price of Grade 5 Textbooks for the Next Year

Suppose that after each academic year, textbook prices increase by 5%. Calculate the price of each Grade 5 textbook for the following academic year and record it in the table below:

No.	Title of the Book	Price (VND)
1	Math Textbooks	
2	Vietnamese Textbooks	
...		
...		

Questions: a) What is the total cost of the Grade 5 textbook set for the next academic year?

b) How much more expensive is the textbook set next year compared to this year?

Instructional Integration Suggestion: Students are invited to share their opinions about the textbook prices for the upcoming school year compared to the current year. Through this discussion, students are educated on the importance of preserving and taking care of their textbooks so that they may be passed on to future students.

4. CONCLUSION

Integrated teaching aims to implement the general education curriculum and is an inevitable trend in meeting the demands of social development. Teachers should pay attention to applying integration either within Mathematics itself or through

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mathematical contexts closely related to real-life situations, as well as through hands-on practice and experiential activities. Integrated teaching provides students with opportunities to develop essential qualities and core competencies.

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