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PRACTICAL ELEMENTS IN THE GRADE 5 MATHEMATICS TEXTBOOK - CÁNH DIỀU SERIES

Dr. Bich Tran Ngoc¹, Dung Do Anh²

¹University of Education - Thai Nguyen University – Vietnam;

²K30 Post graduate student - University of Education - Thai Nguyen University – Vietnam;

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ABSTRACT

This paper presents an in-depth analysis of the Grade 5 Mathematics textbook from the Canh Dieu series, one of four textbook series officially approved by the Ministry of Education and Training for implementation beginning in the 2024–2025 academic year, aligned with the 2018 General Education Curriculum. Embracing the pedagogical philosophy of "bringing life into lessons and bringing lessons into life," the textbook comprises 91 lessons organized around four core themes: Number and Operations, Geometry and Measurement, and Statistics and Probability. Each lesson is systematically structured following a four-phase learning model: Engage – Connect – Explore – Practice – Apply, which incorporates real-life contexts relevant to students' experiences, such as sea level rise due to melting ice, the historical heritage of Yên Thái communal house, rice exports, the velocity of the Thống Nhất train, personal financial management, and making herbal cough syrup from preserved limes. These scenarios serve as a bridge between mathematical concepts and everyday life, promoting meaningful learning and contextual understanding. The textbook effectively integrates interdisciplinary content across subjects such as history, geography, biology, and technology, fostering the development of essential 21st-century competencies including logical reasoning, creativity, collaboration, and autonomous learning. By situating mathematical problems within authentic contexts, the textbook enhances students' ability to transfer knowledge to practical situations, deepens their conceptual understanding, and cultivates a positive disposition toward mathematics. This study underscores the vital role of the mathematics textbook in supporting teachers in designing student-centered, competency-based instruction, while simultaneously creating opportunities for learners to develop both mathematical proficiency and key personal attributes in a holistic manner.

This paper explores the incorporation of real-world applications and contexts in the Grade 5 Mathematics Textbook of the Cánh Diều textbook series, with a focus on how such elements enhance students' mathematical understanding and engagement.

KEYWORDS: Mathematics education, practical application, primary education, Grade 5, mathematics textbook.

1. INTRODUCTION

The General Education Curriculum for Mathematics in Vietnam was issued under Circular No. 32/2018/TT-BGDĐT, dated December 26, 2018, by the Minister of Education and Training [1]. The curriculum has been implemented in Vietnamese primary schools starting from the 2020–2021 academic year at Grade 1, reaching Grade 5 by the 2024–2025 academic year.

On December 1, 2023, the Minister of Education and Training signed Decision No. 4119/QĐ-BGDĐT approving textbooks for Grade 5 subjects and educational activities, as well as Chinese language textbooks for Grades 3 and 4, for use in general education institutions. Among these, four mathematics textbook series for Grade 5 were approved for official use: *Kết nối tri thức với cuộc sống* (Connecting Knowledge with Life), *Chân trời sáng tạo* (Creative Horizons), *Cánh Diều* (Kite), and *Bình Minh* (Sunrise).

The Grade 5 Mathematics textbook from the *Cánh Diều* series is one of the four officially approved textbook series for mathematics at the primary level, as stipulated in Decision No. 4119. Guided by the educational philosophy of “bringing life into lessons, bringing lessons into life,” the *Cánh Diều* Mathematics textbook closely adheres to the learning objectives specified in the Grade 5 Mathematics curriculum. It contributes to the development of students' core mathematical competencies, presents a coherent sequence of skills across the series, and creates opportunities for teachers to innovate in mathematics instruction.

2. Content

2.1. Textbooks and the Role of Textbooks

In alignment with the policy of “one curriculum, multiple textbooks,” the Vietnamese education system allows for a variety of textbook options, offering teachers the autonomy to select and reference materials in their instructional practice, and enabling students to engage with diverse learning resources. Textbooks in Vietnam must undergo a rigorous evaluation and approval process by the Ministry of Education and Training before being authorized for use in schools.

Several Vietnamese scholars have offered distinct perspectives on the nature of textbooks. Hoàng Anh Đức (2023) argues that “a textbook is not a legal mandate but one among several instructional resources that teachers and schools can consult and utilize; it grants autonomy to teachers in designing and implementing lessons” [5]. Nguyễn Thị Thanh Thủy and Mai Sỹ Tuấn (2017) suggest that “a textbook is a specialized form of educational material and serves as a tangible embodiment of the curriculum,” or in other words, “the textbook concretizes the curriculum's objectives, content, and pedagogical orientations for each subject” [9].

In this study, we adopt the view that *a textbook is a resource that operationalizes the learning goals outlined in the curriculum. It supports teaching practices and facilitates students' learning processes.*

The textbook plays a central role as a primary source of academic content for both teachers and students. It standardizes instruction across different classrooms and schools, ensuring that all learners have access to the same core knowledge and are guided toward meeting uniform learning objectives.

Moreover, the textbook functions as both a planning tool for teachers and a learning tool for students. It enables teachers to design coherent lesson plans and provides students with a foundation for self-directed learning and the development of general competencies.

Textbooks also offer reference material to support teachers in explaining complex mathematical concepts, and in providing real-world examples, problems, and exercises that enhance student understanding and engagement.

As an independent learning resource, the textbook empowers students to expand their knowledge, while simultaneously fostering autonomy, self-learning, communication, and collaboration skills.

Furthermore, textbooks play an essential role in diversifying instructional approaches and learning modalities. They help accommodate various learner needs by creating rich, interactive learning environments. Textbooks convey knowledge not only through written text but also via visuals, charts, contextual questions, practice problems, and illustrative scenarios.

Ultimately, textbooks serve as foundational tools in teaching and learning. They assist students in constructing new knowledge, deliver accurate and logically structured information, and promote critical thinking, creativity, and reflective reasoning.

2.2. *Practical Elements in the Grade 5 Mathematics Textbook – Cánh Diều Series*

2.2.1. Overview of the Grade 5 Mathematics Textbook – Cánh Diều Series

The Grade 5 Mathematics textbook from the *Cánh Diều* series comprises 91 lessons organized into four thematic units:

- Theme 1: *Review and Extension of Whole Numbers and Fractions; Introduction to Decimals* – 24 lessons
- Theme 2: *Operations with Decimals* – 25 lessons
- Theme 3: *Geometry and Measurement* – 29 lessons
- Theme 4: *Statistics and Probability; End-of-Year Review* – 13 lessons

Each lesson is designed according to a student-centered learning trajectory that encourages exploration, discovery, and the self-construction of knowledge. The lessons follow an activity-based format, typically structured into four stages: *Engage – Explore – Practice – Apply*.

The *Engage* activity generally begins with a real-life problem situation or an illustrative image designed to spark curiosity, foster motivation, and prompt learners to explore new mathematical ideas. These introductory prompts are crafted from everyday situations, contexts, or visuals that are familiar

and relatable to students. For example, when teaching about trapezoids, textbooks provide real-life images to introduce the lesson [1].

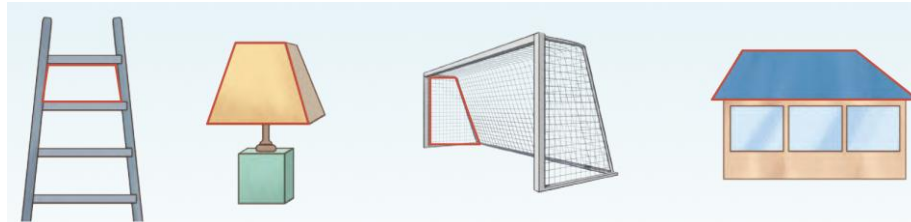


Figure 1: Trapezoid illustrated in the textbook

The *Explore* phase delivers the core mathematical knowledge in a structured and accurate manner, while also modeling approaches to mathematical inquiry. This component not only supports student understanding but also serves as a pedagogical resource to guide teachers in designing effective instructional activities, reflecting appropriate teaching methods and techniques.

The *Practice* phase features a carefully sequenced set of exercises that progress from simple to complex, and from foundational to advanced, thereby reflecting a coherent skill development trajectory. These exercises provide opportunities for students to apply newly acquired knowledge, solve problems, and integrate previously learned concepts. Additionally, through contextualized problems, this phase introduces students to various aspects of Vietnamese culture, economics, and society, thereby linking mathematical learning with real-world issues and fostering interdisciplinary connections.

The *Apply* activity introduces authentic, real-life problem situations that require students to draw upon their mathematical knowledge to devise appropriate solutions. This final phase strengthens students' ability to transfer classroom learning to real-world contexts, enhancing their problem-solving skills and reinforcing the relevance of mathematics in everyday life.

2.2.2. Analysis of Real-World Contextual Elements in the Grade 5 Mathematics Textbook – *Cánh Diều* Series

The philosophy of the *Cánh Diều* Grade 5 Mathematics textbook – “*Bringing life into lessons, bringing lessons into life*” – is vividly reflected in the content and design of individual lessons. Specifically, in Volume 1 of the textbook, 27 problems and tasks incorporate real-world data or factual information, while Volume 2 features 19 such problems grounded in real-life contexts. In addition to authentic contexts, the textbook also presents numerous hypothetical yet realistic scenarios that are familiar and relevant to students, allowing them to apply mathematical knowledge to problem-solving. Based on our analysis, Volume 1 contains 59 problems based on such practical scenarios, while Volume 2 includes 67. Daily student activities, school life, and practical information drawn from their

lived environment serve as the contextual foundation for exercises and tasks throughout the *Cánh Diều* Grade 5 Mathematics textbook.

First, the textbook helps students gain insights into the natural world and apply mathematical knowledge to real-world phenomena. For example, students are introduced to the impact of climate change through the issue of rising sea levels:

“Some studies indicate that melting ice contributes to a 0.5 cm rise in global sea level each year. If this trend continues, how many years will it take for sea levels to rise by 1 meter?”
(p. 89, *Volume 1*).

This problem presents real-world scientific data and requires students to calculate the number of years based on a fixed annual increase. They apply knowledge of measurement conversion (*1 meter = 100 centimeters*) and the operation of dividing a whole number by a decimal ($100 \div 0.5 = 200$) to determine that it would take 200 years.

Another example provides students with factual information about the Cúc Phương National Park:

“The area of Cúc Phương National Park is 22,200 hectares. Write this area in square meters.”
(p. 55, *Volume 1*)

This task reinforces the concept of unit conversion in area measurement, allowing students to translate knowledge of 1 hectare = 10,000 square meters into practice. Moreover, the problem serves as a springboard for teachers to incorporate interdisciplinary content such as geography, ecology, and environmental education, enriching the mathematical experience with broader educational themes.

Second, the textbook integrates real-life cultural, historical, and geographical knowledge about the students' homeland. One example references the Yên Thái Communal House, a historically significant site:

“Did you know? Yên Thái Communal House (Hàng Gai Ward, Hoàn Kiếm District, Hanoi) is dedicated to Consort Ý Lan. Inside the house, there is an ancient well dating back to 1063, which still contains fresh water. The well's mouth is circular with a radius of 66 cm. A surrounding wall, 22 cm wide, was built around the well. Calculate the area of the well's circular border.” (p. 21)

This exercise not only introduces students to Vietnamese history and cultural heritage but also contextualizes a mathematical concept – area of a circular ring – within a tangible real-world object. Students apply the formula for the area of a circle to calculate the surface area of the well's border. The problem also supports interdisciplinary integration, allowing teachers to connect mathematics with subjects such as history and geography, exemplifying the *cross-curricular approach* promoted by the curriculum.

The Textbook also incorporates real-life information and hypothetical situations for students to apply mathematical knowledge in problem-solving. For example:

"Uncle Toan's family traveled from Hanoi to Nha Trang by plane. The departure time was 10:40 a.m.

a) According to regulations, passengers must arrive at the airport at least 90 minutes before departure time. What is the latest time Uncle Toan's family should be at the airport?

b) The flight takes approximately 1 hour and 50 minutes. What time does the plane land at Cam Ranh Airport (Khanh Hoa)?" (p. 56)

This problem provides students with practical information: when traveling by air, passengers are required to be at the airport 90 minutes before departure, and the flight duration from Noi Bai to Cam Ranh is approximately 1 hour and 50 minutes. These real-life facts serve as context for designing the problem, allowing students to apply their knowledge of addition and subtraction of time measurements. In reality, anyone traveling by air must determine the appropriate time to arrive at the airport for check-in and the estimated landing time at the destination. Through this, students recognize the practical applications of mathematics in everyday life.

Thirdly, *Math 5 – Canh Dieu* provides students with knowledge about the socio-economic development of the country. The textbook presents information about Vietnam's rice exports in 2020 and uses a pie chart to represent the data. *"In 2020, Vietnam exported an estimated 6.15 million tons of rice, generating 3.07 billion US dollars in revenue. The pie chart below represents the proportion of each rice type within the total export volume (expressed as percentages). White Rice 45,2%; Glitinous Rice 9%; Fragrant Rice 26,8%; Other Rice 19%" (p. 82)*

From this real-world context, students learn about Vietnam's rice export figures for 2020, shown as percentage ratios in a pie chart. The task provides an opportunity for students to develop problem-solving competence and mathematical communication skills through activities involving data reading and posing questions about the chart. Consequently, students can observe how mathematics is present all around them in real life.

In addition to information about rice exports, *Math 5 – Canh Dieu* also provides data on Vietnam's crude oil production from 2018 to 2021. The production figures are presented as decimal numbers in units of million tons. *"Read the following data table:*

Table 1. Vietnam's crude oil output from 2018 to 2021 in the textbook

Years	2018	2019	2020	2021
Crude oil production (million tons)	13,969	13,090	11,470	0,970

- a) How many million tons less crude oil did Vietnam produce in 2021 compared to 2020?
- b) What was the total crude oil production of Vietnam from 2018 to 2021?
- c) Calculate the average crude oil production per year over the period from 2018 to 2021.
- d) To reach the average production level, how many more million tons would Vietnam need to produce in 2022 compared to 2021?" (p. 90)

This sequence of questions aims to engage students in applying knowledge of decimal addition and subtraction, as well as calculating the arithmetic mean of Vietnam's crude oil output between 2018 and 2021. The problem presents numerical data in the form of a statistical table, prompting students to read the data and respond accordingly. This activity allows students to use mathematical knowledge to deepen their understanding of crude oil production figures over the four years, identify which year had higher output, calculate the total production, and determine the average annual output during the given period.

Fourthly, the textbook helps students perceive the development of science and technology both globally and nationally. It introduces students to real-world contexts such as supersonic rocket speeds, the average velocity of spacecraft, and changes in the duration of North–South railway journeys across different time periods,

Mach speed is a unit of measurement used to compare an object's speed with the speed of sound in a given medium. There are various ranges of supersonic speed: low supersonic (Mach 1–3), medium supersonic (Mach 3–5), high supersonic (Mach 5–10), and hypersonic (above Mach 10). The textbook introduces the concept of Mach 2 through the following problem: "A rocket travels at a supersonic speed of Mach 2 (twice the speed of sound). How far does the rocket travel in one hour? Assume the speed of sound is approximately 20,600 meters per minute." (p. 65). This problem provides students with the real-world data—the speed of sound (20,600 m/min) and the rocket's speed (Mach 2). Students are then required to apply the formula for uniform motion to calculate the distance covered in one hour.

Additionally, the textbook incorporates authentic data to highlight the evolution of the transportation sector, specifically railway travel. For instance, one exercise presents the following scenario: "The North–South railway (also known as the *Thống Nhất* line) runs from Hanoi to Ho Chi Minh City with a total length of 1,726 kilometers. The table below shows the travel time of the *Thống Nhất* train at various points in time:

Table 2: The travel time of the Thống Nhất train at some points in the textbook

Time	Train running time
Date 31/12/1976	72 hours
Date 19/5/1989	52 hours
Date 19/5/1999	32 hours
From 2019 to 2023	23 hours

a) Calculate the average speed of the train for each period (round to the nearest whole number).

b) Comment on the changes in the train's speed over time." (p. 62)

In this task, students apply their knowledge to calculate and compare speeds, thereby understanding the technological advancements and the progressive development of the railway system in Vietnam.

Fifthly, the textbook offers students opportunities to explore the mystery and beauty of mathematics through practical problems and real-life scenarios. Many real-life situations embody mathematical beauty, encouraging students to explore their surroundings. Mathematics is not merely abstract numbers; every figure in real life holds meaning. Grade 5 Mathematics—*Cánh Diều*—includes a task: “Find out the meaning of the numbers on a citizen identification number and share with your peers.” (p. 62-1). This allows students to understand that each person has a unique ID number and explore the significance of those digits. Through this, students can see how mathematics is embedded in everyday life and how it serves society.

Another example features a familiar household context requiring mathematical reasoning: “To make a natural cough remedy, people soak preserved lemons with honey and rock sugar. For every 2 kg of lemons, 1 liter of honey and 1 kg of candy are needed. Based on this information, how much honey and candy would be needed for 4 kg of lemons?” (p. 30-1)

Mathematical applications in nature are also explored in exercises such as: “Find a large tree in your schoolyard, measure the circumference of the trunk, and estimate its diameter.” (p. 19)

Moreover, the textbook integrates tasks and situations addressing environmental protection, marine and island awareness, financial literacy, and patriotism—rooted in real-life contexts. For example, a problem on financial management states: “After receiving advice on financial management, Ms. Mai decides to divide her family's monthly income into three parts with the following ratios: 50% for essential expenses (e.g., housing, food, utilities), 30% for discretionary spending (e.g., travel, shopping, entertainment), and 20% for savings or debt repayment. Given that her family's monthly income is approximately 17 million VND, calculate the amount allocated to each category.” (p. 106, vol. 1). This task not only helps students practice percentage calculations but also educates them on

financial literacy—spending 50% on essentials, 30% on non-essentials within limits, and reserving 20% for savings or future investments.

Thus, the *Cánh Diều* Grade 5 Mathematics textbook embeds a wealth of real-life contexts across various life domains within its exercises and scenarios. Students are given ample opportunities to apply mathematical knowledge to solve real-world problems. Through this approach, learners are supported in developing both general competencies and specific mathematical capabilities.

3. CONCLUSION

The above analysis demonstrates that practical aspects of real life are thoroughly integrated into the *Grade 5 Mathematics Textbook – Cánh Diều Series*, providing students with opportunities to apply mathematical knowledge and skills to solve real-world problems. Through this analysis, we assess that the textbook incorporates a rich variety of real-life elements, offering students deeper insights into various aspects of daily life. These contextualized situations not only reinforce mathematical concepts but also promote connections between mathematics and cultural, economic, and social realities.

The *Grade 5 Mathematics Textbook – Cánh Diều Series* effectively embodies the principle of "*bringing life into the lessons and bringing the lessons into life*," contributing meaningfully to the orientation of competency-based and character development education.

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