

Integrating Financial Education into Teaching Mathematics at the Secondary School through Experiential Activities – A Case Study in Vietnam

Nguyen Huu Hau¹, Dao Hong Nam^{2*}, Hoa Anh Tuong³, Nguyen Thuy Van⁴, Vu Duc Hieu⁵.

¹ Faculty of Primary Education, Hong Duc University, Thanh Hoa City, Vietnam

^{2*} Faculty of fundamental Sciences, University of Medicine and Pharmacy at Ho Chi Minh City, Viet Nam.
daohongnam@ump.edu.vn

³ Faculty of Mathematics, Sai Gon University, Hochiminh City, Vietnam

⁴ Faculty of Education, Phu Yen University, Tuy Hoa City, Vietnam

⁵ Van Lang Secondary School, Hochiminh City, Vietnam

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Abstract:

The topic of "Functions" in the 8th and 9th-grade mathematics curriculum constitutes a fundamental component with extensive applications in both mathematics and related disciplines. However, it presents significant challenges in both teaching and learning. This paper explores key aspects of experiential learning theory, the integration of financial education into mathematics instruction, and the interplay between these two approaches. Additionally, it examines an educational institution through the lens of financial education objectives and proposes instructional scenarios that embed financial concepts within the teaching of functions in Grades 8 and 9. The integration of financial education into mathematics instruction not only enhances student engagement but also fosters opportunities for knowledge discovery and facilitates the application of mathematical concepts to real-world problem-solving.

Keywords: Financial education, integration, function, math 8, math 9

1. Introduction

In the contemporary economic landscape, equipping lower secondary school students with personal financial literacy is essential for fostering early financial management skills and cultivating a responsible financial mindset. As economic systems become increasingly complex, financial literacy empowers students to develop independent thinking, make informed financial decisions, and establish prudent spending habits. By acquiring these competencies at an early stage, students can build a strong foundation for future financial stability and economic well-being. Personal financial literacy extends beyond fundamental money management skills such as saving, budgeting, and responsible spending. It also plays a critical role in shaping students' perceptions of financial responsibility, work ethics, and the intrinsic value of money. Through structured financial education, students can enhance their capacity to assess financial risks, mitigate potential financial pitfalls, and make sound financial decisions that positively impact their personal and professional lives.

Notably, children today are exposed to financial concepts from an early age. Therefore, it is crucial to foster positive financial behaviors and implement appropriate educational strategies within families,

schools, and society at large. A growing body of research highlights the significant benefits of equipping children with financial knowledge early in life, emphasizing its role in shaping their future financial competence and decision-making abilities. However, according to Đinh Thị Thanh Vân and Nguyễn Thị Huệ, in their study "*Measuring and Evaluating Factors Affecting University Students' Personal Financial Literacy*," conducted a survey revealing that financial literacy levels in Vietnam, particularly among young people, remain relatively low compared to global standards. Mathematics is widely recognized as a foundational subject that provides essential knowledge for financial management. However, the integration of financial management education into mathematics instruction at the lower secondary level presents significant challenges, particularly concerning curriculum design, pedagogical approaches, and students' financial awareness. A primary obstacle lies in the current mathematics curriculum, which predominantly emphasizes theoretical and academic content while lacking sufficient integration of real-life financial applications. This disconnect between abstract mathematical concepts and practical financial contexts hinders students' ability to apply their mathematical knowledge to real-world financial decision-making (Lusardi & Mitchell, 2014).

Moreover, conventional teaching methodologies often focus on solving structured exercises based on predefined formulas rather than fostering analytical thinking and problem-solving skills in financial contexts. As a result, students receive limited guidance on applying mathematical concepts to essential financial tasks, such as budgeting, expense management, and interest rate calculations (OECD, 2020). This instructional approach restricts students' development of financial reasoning abilities, thereby diminishing the overall effectiveness of financial education through mathematics.

Another critical challenge is students' level of financial awareness and their attitudes toward personal finance. Many students have minimal exposure to financial management in their daily lives, making it difficult for them to engage with and internalize financial knowledge in meaningful ways. The lack of firsthand financial experiences further impedes their ability to connect theoretical learning with practical financial decision-making (Fernandes, Lynch, & Netemeyer, 2014).

To address these challenges and enhance the effectiveness of financial education within mathematics instruction, financial education has been systematically integrated into the mathematics curriculum from Grade 2 to Grade 12. This initiative aims to equip students with essential skills to "*solve daily financial problems*" and "*make appropriate personal financial decisions*". It is imperative to implement curriculum reforms, adopt innovative teaching strategies, and foster a learning environment that closely aligns with students' real-world financial experiences. By integrating financial management concepts into mathematical instruction in a practical and engaging manner, students can develop the financial literacy skills necessary for responsible and informed economic decision-making in the future.

Furthermore, integrating financial education into the curriculum fosters essential cognitive skills, including critical thinking, problem-solving, and resource management. These competencies are crucial for navigating financial challenges and making informed economic choices in adulthood. Thus, the incorporation of financial literacy in early education is not merely an educational initiative but a strategic investment in preparing future generations to navigate and thrive in an increasingly dynamic global economy. This paper examines key theoretical aspects, including experiential learning theory, the integration of financial education into mathematics instruction, and the intersection of these

approaches in teaching practices. Furthermore, it analyzes financial education objectives from an institutional perspective. Based on these foundations, we develop a teaching scenario that embeds financial concepts within the instruction of "*Functions*" in Grade 8 and Grade 9 mathematics.

2. Literature Review

2.1. Experiential Learning Theory

A key innovation of Vietnam's 2018 General Education Program (GEP) is the formal integration of experiential learning into the curriculum. Specifically, "Experiential Activities" at the primary level and "Experiential and Career-Oriented Activities" at the lower and upper secondary levels have been established as compulsory educational components. These activities function as independent programs with dedicated instructional time, similar to traditional academic subjects. Their primary objectives include cultivating three fundamental competencies: adaptability to life, the ability to design and organize activities, and career orientation. Additionally, experiential learning fosters essential personal attributes, general competencies, and subject-specific skills, thereby enhancing students' overall educational development.

Experiential learning is defined as an educator-guided process that provides students with opportunities to engage in real-life situations, experience positive emotions, utilize prior knowledge, and integrate subject-specific skills to complete assigned tasks or solve practical problems in various contexts, including school, family, and society. Through active participation, students transform prior experiences into new knowledge, deepen their understanding, and enhance their skill sets. This process fosters creativity, adaptability, and preparedness for future career pathways. Research has consistently underscored the significance of experiential learning in education. Spector and Gibson (1991) assert that "learning through experience helps students develop competence and confidence in handling challenges and navigating new situations." Similarly, Orion and Hofstein (1991) emphasize that experiential learning allows students to apply a broader range of subject knowledge, refine their learning objectives, and identify their strengths and weaknesses in relation to their goals (Trương Duy Hải, 2017, p. 13).

Incorporating experiential activities into mathematics instruction enhances student engagement and improves learning outcomes. The interactive nature of experiential learning fosters critical thinking, problem-solving, and communication skills, while collaborative experiences with teachers and peers build confidence and teamwork abilities. As a result, structuring instruction around experiential learning provides students with meaningful opportunities to develop both personal competencies and academic skills in alignment with contemporary educational objectives.

Kolb's experiential learning model conceptualizes learning as a continuous, cyclical process that allows students to enter at any of the four stages based on learning content, individual learner characteristics, or instructional goals. The first stage, *Concrete Experience (CE)*, involves hands-on activities such as reading academic materials, attending lectures, watching instructional videos, or completing specific tasks. These activities provide sensory stimuli that shape students' perceptions and cognitive processing. The second stage, *Reflective Observation (RO)*, requires students to critically analyze their experiences, extract key insights, and identify patterns that inform future learning. This reflective process deepens comprehension and refines conceptual understanding. The third stage,

Abstract Conceptualization (AC), facilitates the transformation of concrete experiences into structured knowledge. Through reasoning, analysis, and synthesis, students construct theoretical frameworks and abstract concepts. The final stage, *Active Experimentation (AE)*, emphasizes the application of newly acquired knowledge to real-world scenarios. Kolb highlights this phase as crucial for validating learning through practical application, reinforcing knowledge retention, and fostering critical problem-solving skills.

By embedding experiential learning into the curriculum, particularly in mathematics education, students gain a more holistic and applied understanding of the subject. This approach not only enhances academic achievement but also equips students with the adaptability and analytical skills necessary for lifelong learning and professional success. The integration of experiential learning represents a significant pedagogical advancement, ensuring that education remains responsive to the evolving demands of the modern world.

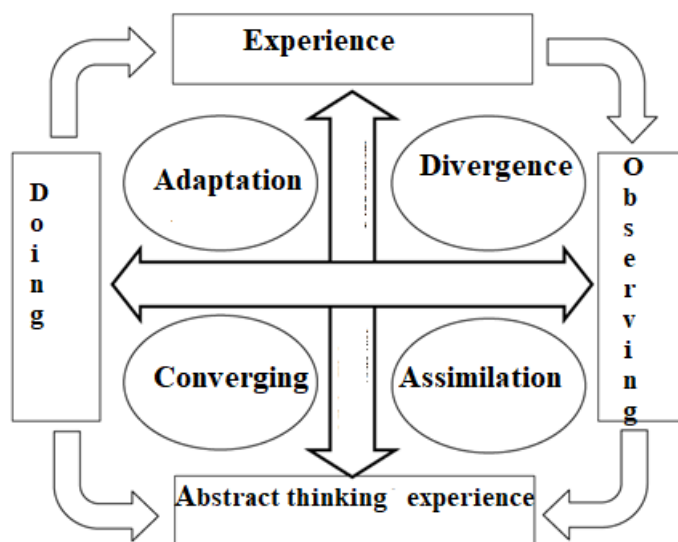


Figure 1. Experience based learning process

2.2. Integrating Financial Education into Mathematics Instruction

Recognizing the significance and far-reaching implications of financial education, the Prime Minister of Vietnam approved the **National Comprehensive Financial Strategy to 2025, with a Vision to 2030** on January 22, 2020. A fundamental aspect of this strategy is the integration of financial education within the national general education curriculum, as articulated in the directive: "*Incorporating financial education content into the national general education program.*" This initiative reflects a commitment to equipping students with essential financial knowledge and skills, enabling them to make informed financial decisions in both personal and professional contexts.

According to **Đỗ Đức Thái (2020)**, financial education within Vietnam's general education curriculum is categorized into five core domains: **(1) Money and Transactions, (2) Financial Planning, (3) Financial Management, (4) Financial Risk Management, and (5) Financial Contexts.** These domains encompass a comprehensive spectrum of financial competencies, reinforcing the role of financial literacy in shaping responsible economic behavior. Research underscores the intrinsic

connection between mathematics and finance, given that mathematics inherently involves numerical operations, mental calculations, estimation, logical reasoning, and the evaluation of financial decisions. These fundamental mathematical skills are indispensable for fostering economic and financial literacy, making the integration of financial education into mathematics instruction both pedagogically sound and practically essential.

As highlighted by **Đỗ Đức Thái (2020)**, embedding financial education within mathematics instruction yields several key benefits: 1) **Enhancing financial literacy** – Providing students with foundational knowledge of financial products and risks, strengthening their ability to make informed financial decisions. 2) **Fostering financial awareness** – Enabling students to comprehend the nature, function, and significance of money, as well as the importance of financial management, thereby promoting responsible financial decision-making. 3) **Developing responsible financial behavior** – Cultivating students' attitudes toward finance and money, instilling a sense of accountability, and reinforcing ethical financial practices.

The **Organisation for Economic Co-operation and Development (OECD)** defines financial education as: *“A process through which individuals, businesses, and investors enhance their understanding of financial concepts and products by acquiring information, receiving guidance, and/or seeking advice. This process enables them to develop financial skills, gain a clearer awareness of risks and opportunities, make informed decisions, identify sources of support, and take effective actions to improve their financial well-being”* (Đỗ Đức Thái, 2018, p. 3).

In summary, financial education is instrumental in shaping a financially literate generation capable of applying their knowledge in real-world contexts. Beyond benefiting individuals and families, it contributes to national economic growth and aligns with global financial literacy initiatives.

2.3. Integrating Experiential Learning Theory with Financial Education in Mathematics Instruction

Integrating financial education into mathematics instruction at the secondary school level through experiential activities represents a promising strategy for enhancing both mathematical competencies and financial literacy. This approach capitalizes on the natural synergy between mathematics and finance, equipping students with practical skills applicable to real-world financial situations. Research suggests that incorporating financial literacy into mathematics through problem-solving with economic content helps students develop essential financial skills, such as money management and thriftiness, particularly in early secondary education (Tobakhanov & Nazarova, 2024). Furthermore, experiential learning methodologies, including financial games such as *Ranoka*, have demonstrated effectiveness in engaging students and improving their financial competence (Miras-Rodríguez et al., 2024). Interactive teaching approaches, such as economic simulations, provide students with hands-on experiences in budgeting and risk management, fostering critical financial decision-making skills (Kalashnikov et al., 2024).

Aligning financial literacy education with contemporary curriculum reforms that emphasize real-life applications supports the development of well-rounded competencies essential for navigating complex financial environments (Tien, 2023). However, despite its numerous benefits, integrating financial education into mathematics instruction presents certain challenges, including psychological barriers

and students' limited exposure to real-world financial scenarios. Addressing these challenges necessitates the adoption of innovative instructional tools, collaboration with industry experts, and the use of technology-driven experiential learning methods to bridge the gap between theoretical knowledge and practical application. A holistic educational approach that integrates financial literacy within mathematics instruction can empower students to make informed financial decisions, thereby preparing them for an increasingly dynamic and interconnected financial landscape (Singh & Singh, 2024).

Building upon existing theoretical perspectives, this study posits that integrating experiential learning theory with financial education in mathematics instruction is both scientifically sound and practically relevant, particularly in the context of contemporary educational reforms. Experiential learning is characterized by its interdisciplinary nature, making it a highly effective approach for imparting financial knowledge through active engagement. By interacting with financial concepts through experiential activities, students become more engaged, develop a deeper understanding of abstract principles, and recognize the practical applications of financial literacy in their everyday lives.

2.3. Analyzing the Curriculum Through the Lens of Financial Education Objectives

The concept of functions has been extensively examined by numerous scholars within the context of the Vietnamese lower secondary mathematics curriculum and textbooks. However, existing research has not sufficiently explored the extent to which financial concepts are integrated into the teaching of functions from a financial education perspective. Addressing this gap, the present study aims to investigate the incorporation of financial principles within the functions topic in lower secondary mathematics textbooks, specifically in Grade 8 and Grade 9.

To achieve this objective, the study employs a systematic review of the current mathematics curriculum and textbooks, focusing on the ways financial education principles are embedded in the presentation of functions. Through an in-depth analysis of instructional content, problem sets, and contextual applications, the study evaluates whether mathematical functions are linked to real-world financial scenarios, such as interest rate calculations, budgeting models, and economic trend analysis. By adopting a financial education lens, this research seeks to assess the pedagogical effectiveness of integrating financial literacy within mathematics instruction and to propose potential enhancements that align with modern educational objectives.

3. Research Methodology

This study adopts an experimental research design to develop and implement lesson plans that integrate mathematical functions with principles of personal financial management. The instructional approach incorporates experiential learning activities within the mathematics curriculum for 8th and 9th-grade students, aiming to enhance their ability to apply mathematical concepts in real-world financial contexts. Key financial topics—including currency, investment, business operations, profit, and loss—are systematically embedded into function-related lessons to foster students' financial literacy and problem-solving skills.

The experimental implementation was carried out at Vãn Lang Secondary School, where educators facilitated instructional activities in conjunction with the "Science and Life" event. This event provided

students with opportunities to engage in hands-on scientific exploration through activities such as the "Water Rocket Launch," "All-Terrain Vehicle Challenge," and various handmade product exhibitions. These activities were strategically designed to promote inquiry-based learning, stimulate creativity, and encourage the application of theoretical knowledge to practical scenarios. The structured organization of these events ensured alignment with the study's research objectives and maintained the scientific rigor of the experimental approach.

Data collection for this study involved systematic observation of students' engagement and learning processes, along with the documentation and analysis of student-generated learning products. These artifacts serve as empirical evidence of the instructional approach's effectiveness, contributing to an assessment of the study's validity and reliability. The collected data provide insights into the pedagogical impact of integrating financial literacy into mathematics education, offering a foundation for further investigation.

Future research will focus on evaluating student learning outcomes and instructional effectiveness through both qualitative and quantitative measures. Key areas of analysis will include students' academic performance, their development of financial reasoning skills, and their overall satisfaction with the integrated curriculum. Further studies will seek to refine the pedagogical framework, assess long-term impacts on student competency, and explore potential scalability for broader educational applications.

4. Results

4.1. Functions in the Grade 8 Mathematics Curriculum and Textbooks from a Financial Education Perspective

- Functions in the Grade 8 Mathematics Textbook

The Grade 8 mathematics textbook introduces the concept of functions through the examination of relationships between two variables in real-world contexts (e.g., temperature over time, mass and volume, speed and time). Students engage in exercises that involve calculating values, constructing tables of corresponding values, and making observations about the dependence of one variable on another, ultimately leading to the formal definition of a function.

However, the textbook presents function graphs exclusively from a mathematical perspective, without incorporating activities or examples that illustrate their connections to real-world applications, including financial contexts.

Upon critical analysis, it is evident that while the textbook initially introduces functions using practical examples, it subsequently treats the concept as an abstract mathematical tool rather than a means to solve real-life problems. Notably, there is a lack of emphasis on the application of functions in financial and economic contexts, and financial literacy-related content is entirely absent.

- **Classification of Task Types Related to Functions in the Grade 8 Mathematics Textbook**

Table 2.1. Statistical Analysis of Function-Related Exercises in the Grade 8 Mathematics Textbook

Task Type	Description	Mathematical Exercises	Real-World Applications
T_{inh}	Calculating function values at a given point within the domain	2	2
$T_{nh\an\ dang}$	Identifying functions	4	1
T_{ve}	Graphing functions	6	2

An analysis of the textbook content reveals that the exercises predominantly focus on addressing mathematical problems within the discipline itself. Of the 17 exercises related to functions, only five incorporate real-world contexts. Notably, none of the exercises, examples, or activities pertain to economics, finance, or monetary concepts. This suggests that the Vietnamese mathematics curriculum places excessive emphasis on abstract problem-solving while neglecting the practical applications of functions, particularly in financial and economic domains.

4.2. Functions in the Current Grade 9 Mathematics Curriculum and Textbooks from the Perspective of Financial Education

- Functions in the Grade 9 Mathematics Textbook

The Grade 9 mathematics textbook presents the concept of functions and their properties in a more structured and comprehensive manner. With the introduction of increasing and decreasing functions, students at this level are exposed to the three fundamental epistemological characteristics of functions: variation, correspondence, and dependence.

However, similar to the Grade 8 textbook, the approach to presenting new mathematical knowledge remains largely confined within pure mathematics. The textbook primarily focuses on equipping students with the knowledge and skills necessary to solve abstract mathematical problems, with minimal emphasis on real-world applications, particularly those related to financial decision-making.

4.2.2 Classification of Task Types Related to Functions in the Grade 9 Mathematics Textbook

Table 2.2. Statistical Analysis of Function-Related Exercises in the Grade 9 Mathematics Textbook

Task Type	Description	Mathematical Exercises	Real-World Applications
T_{inh}	Calculating function values at a given point within the domain	3	3

$T_{nh\grave{a}n\ d\grave{a}ng}$	Identifying functions	2	1
$T_{v\grave{e}}$	Graphing functions	6	1
$T_{di\grave{e}m\ th\ddot{u}oc}$	Determining points on a function's graph	2	0

Based on Table 2.2, it is evident that the Grade 9 textbook and its accompanying workbook predominantly focus on pure mathematical exercises, with only **five out of eighteen** problems utilizing real-world contexts. Furthermore, most real-world applications are related to motion problems, with no examples, activities, or exercises illustrating the role of functions in finance. This lack of financial applications can be attributed to the relatively recent emergence of financial education within Vietnam's educational framework. As a result, financial literacy has yet to receive significant attention in the current curriculum and textbooks.

4.3. Designing Learning Scenarios Incorporating Financial Themes in Teaching Functions

Implementation Approach

- Group Work: Students will collaborate in groups of six.
- Estimated Duration: 80 minutes.

Inspired by *Algebra 1* (Holiday et al., 2002), which integrates financial education into function-related instruction, this study develops an experimental teaching scenario as a mini-project. The scenario introduces the concept of the function graph $y = ax + b$ ($a \neq 0$), while concurrently integrating financial concepts related to currency, investment, and business through an experiential learning approach.

4.3.1. Scenario Content

In this scenario, students will watch a video demonstrating the candle-making process, identify the materials required to produce Tealight candles, and utilize modern technological tools to research prices and calculate costs. Through this activity, students will actively explore, experiment, and construct knowledge, ultimately applying their understanding of function graphs to solve real-world financial problems assigned by the teacher.



Scenario Structure

- Contextual Background

To provide students with an engaging and meaningful learning experience that fosters scientific exploration and creativity, Văn Lang Secondary School is organizing a "Science in Everyday Life"

festival on September 5, 2024. The festival will feature a variety of activities, including: 1) Water Rocket Launching; 2) Off-Road Vehicle Challenge. 3) Handmade Craft Stalls

This year, Class 9/1 is setting up a handmade scented candle stall, with all proceeds donated to underprivileged children in Tân Định Ward, District 1.

- Learning Task

Objective: Assist Class 9/1 in planning their scented candle stall by completing the following tasks.

Task 1:

- (a) Watch a video explaining the Tealight candle-making process and list the required materials.
- (b) Research the prices of candle-making materials from Heny Garden (<https://henygarden.com>) and record them in the following table:

Nhiên liệu	Mô tả	Giá tiền
Sáp cọ làm nến P-45 Heny Garden	Có màu trắng sữa, dễ pha màu, nhiệt độ nóng chảy là 45 – 50°C.	(đồng/kg)
Tinh dầu thiên nhiên họ thảo mộc	Tinh dầu sả chanh, lục bạc hà (theo tỉ lệ 100 gr sáp ứng với 5ml tinh dầu)	(đồng/ 10ml)
Bấc nến Tealight	Làm bằng cotton bọc sáp, chiều cao 2cm.	(đồng/bấc)
Vò nến Tealight	Bảng nhựa cứng chịu nhiệt có dung tích 15 gram sáp nến, đốt từ 4-5 giờ.	(đồng/vò)
Dụng cụ làm nến	Gồm hoa trang trí, màu, keo dán...	30000 đồng

Figure 2. Learning product form students

Task 2: Calculate the material cost and total cost of producing palm wax Tealight candles for 1, 5, 10, and x candles. Provide a detailed explanation of the calculation method.

Task 3: Randomly select a number of candles for production and calculate the material cost and total cost. Complete the table accordingly.

Task 4: Recite the steps for graphing the function $y = ax$ (where $a \neq 0$), and plot the graph representing the material cost (y_{NL}) on the coordinate plane Oxy .

Task 5: Analyze the values of the two functions representing the material cost (y_{NL}) and total cost (y_{TC}) for the same number of candles (x).

Task 6: Plot the total cost values (x, y) for soy-based Tealight candles (from Task 3) on a coordinate plane. Graph the function representing the total cost and analyze the characteristics of the function $y = ax + b$ (where $a \neq 0$).

Task 7: After calculating production costs, Class 9/1 set the selling price of each palm wax Tealight candle at 17,000 VND. Analyze the profit, loss, and breakeven points as functions of the number of candles sold. Provide multiple explanations where possible.

4.3.2 Strategies and Observations from the Experiment

Phase 1: Concrete Experience (20 minutes)

Students complete Tasks 1a, 1b, and 2.

- **Task 1a:** Students list materials required for Tealight candle production after observing a video demonstration. Most groups compiled a comprehensive list.

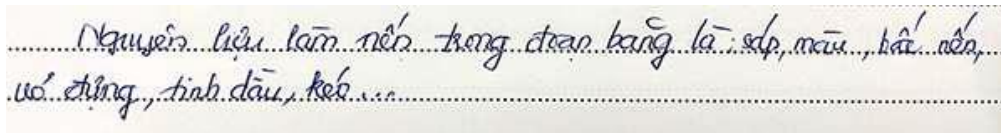


Figure 3. Group 1's work - Task 1a in the worksheet

- **Task 1b:** Students research the prices of materials for scented Tealight candles using the Heny Garden website. The worksheet includes details on wax type, essential oils, weight, and unit measurement. Results were consistent across groups.

Nguyên liệu	Mô tả	Giá tiền
Sáp cọ làm nến P-45 Heny Garden	Có màu trắng, nhiệt độ nóng chảy là 45 – 50°C.	235000 (đồng/kg)
Tinh dầu thiên nhiên họ thảo mộc	Tinh dầu sả chanh, lục bạc hà (theo tỉ lệ 100 gr sáp ứng với 5ml tinh dầu)	69000 (đồng/10ml)
Bấc nến Tealight	Làm bằng cotton bọc sáp, chiều cao 2cm.	500 (đồng/bấc)
Vỏ nến Tealight	Hình tròn, làm bằng nhựa cứng chịu nhiệt có dung tích 15 gram sáp nến.	3000 (đồng/vỏ)
Dụng cụ làm nến	Gồm keo dán bấc, kéo, màu nến...	30000 đồng

Figure 4. Group 1's work - Task 1b in the worksheet

- **Task 2:** Using information from Task 1, students calculate material and total costs for producing 1, 5, 10, and x candles. Most groups employed numerical calculations rather than formula-based methods. Some students mistakenly treated the cost of candle-making tools as variable costs.

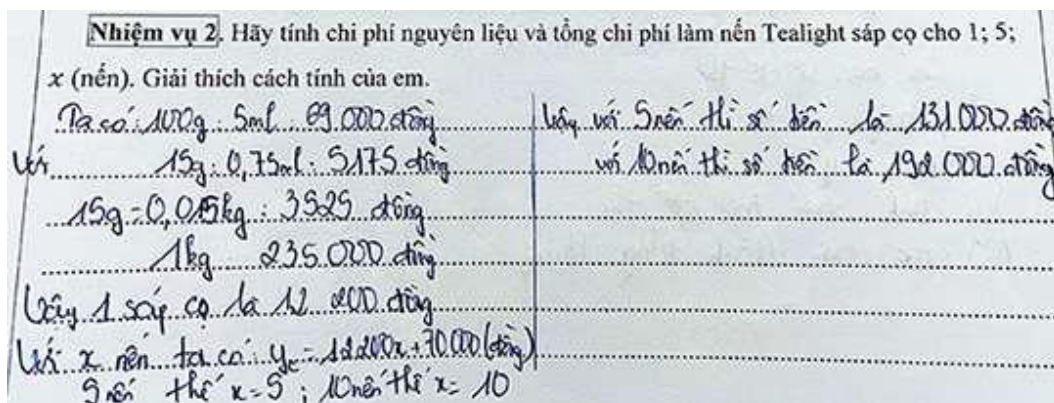


Figure 5. Group 3's work - Task 2 in the worksheet

To clarify cost structures, the teacher introduced function-based models through guided questioning.

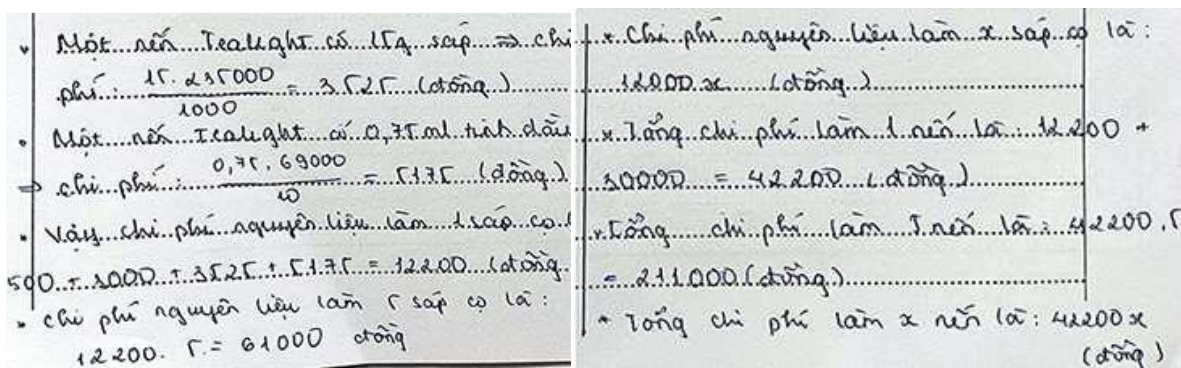


Figure 6. Group 4's work - Task 2 in the worksheet

Phase 2: Exploration and Prediction (20 minutes)

Students complete Tasks 3, 4, 5, and 6.

- After establishing formulas for $y_{\{NL\}}$ and $y_{\{TC\}}$, students complete Task 3, graph $y = ax$, and plot the material cost function $y_{\{NL\}} = 12200x$. Although most groups succeeded, some struggled with large values of $y_{\{NL\}}$.

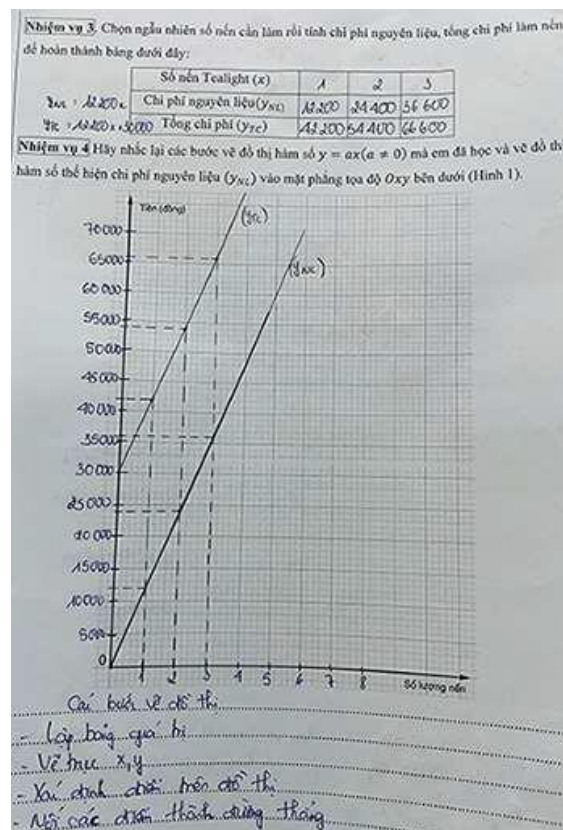


Figure 7. Group 3's work - Tasks 3 and 4 in the worksheet

- **Task 5:** Students observed that the total cost function $y_{\{TC\}}$ exceeds the material cost function $y_{\{NL\}}$ by 30,000 VND.

Số chi phí nguyên liệu ít hơn tổng chi phí 30.000 đồng.
 Ví dụ: làm 3 năm sẽ tốn 36.600 đồng tiền nguyên liệu
 nhưng sẽ tốn 66.600 đồng tổng chi phí (tức 30.000 số vốn
 số tiền nguyên liệu (66.600 - 36.600 = 30.000 đồng))

Figure 8. Group 3's work - Task 5 in the worksheet

- **Task 6:** Students plotted y_{TC} on the coordinate plane, but most only noted that it forms a straight line parallel to y_{NL} .

Đồ thị hàm số (y_{TC}) là đường thẳng.
 Đồ thị (y_{TC}) song song (y_{NL})
 Đồ thị hàm số (y_{TC}) là đường thẳng luôn luôn và hướng
 lên

Figure 9. Group 4's work - Task 6 in the worksheet

Phase 3: Verification and Confirmation (20 minutes)

Students engage in group discussions with teacher guidance.

- **Activity 1:** The teacher facilitates verification of linear function graphs using GeoGebra and Sketchpad.

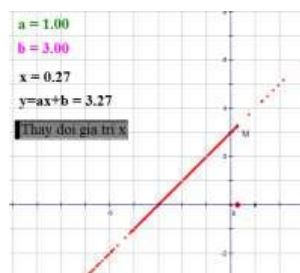


Figure 10. Sketchpad screen illustration in Phase 3

Phase 4: Application and Consolidation (20 minutes)

Students collaborate to solve Task 7.

Cho x là số cây nên bán để được $0 < x \in \mathbb{N}^+$
 Ta có hàm số $y_{TC} = 17000x + 30000$ là
 tổng chi phí làm nên
 $y = 17000x$ là số tiền bán nên
 + để có lợi nhuận: $y > y_{TC}$
 $\Leftrightarrow 17000x > 17000x + 30000$
 $\Leftrightarrow 0 > 30000 \Leftrightarrow$ sai
 Vậy để bán từ 7 năm trở lên thì có lợi
 + để hòa vốn: $y = y_{TC}$
 $\Leftrightarrow 17000x = 17000x + 30000$
 $\Leftrightarrow 0 = 30000 \Leftrightarrow$ sai
 Vậy không hòa vốn
 + để bị lỗ: $y < y_{TC}$
 $\Leftrightarrow 17000x < 17000x + 30000$
 $\Leftrightarrow 0 < 30000 \Leftrightarrow$ đúng
 Vậy bán dưới 7 năm thì lỗ

Figure 11. Group 3's work - Task 7 in the worksheet

- Most groups used an inequality-based strategy to analyze profit, loss, and breakeven points. Although graphing strategies were underutilized, some students, such as Phuc, successfully incorporated graph-based analysis. Increased exposure to graphical representations of revenue functions may encourage broader adoption of this method.

4. Discussion and Conclusion

The findings of this study underscore the effectiveness of integrating experiential learning principles and personal financial management content into the teaching of functions in the Grade 8 and 9 mathematics curriculum. This innovative pedagogical approach not only strengthens students' conceptual understanding of functions but also enhances their ability to navigate real-world financial scenarios. Unlike traditional instructional methods that focus primarily on theoretical comprehension and textbook-based exercises, this approach provides students with opportunities to engage in thoughtfully designed experiential learning activities that uphold both academic rigor and practical relevance. Through active participation in these tasks, students reinforce their mathematical knowledge while simultaneously developing financial literacy, thereby demonstrating the feasibility and educational value of this integrated methodology.

This study contributes to the evolving landscape of mathematics education by advocating for the incorporation of real-world financial concepts into mathematical instruction through experiential learning. In the context of globalization, financial education has become an essential component of school curricula worldwide, recognized as a key strategy for enhancing national financial literacy. Consequently, embedding financial education within mathematics instruction is both necessary and aligned with contemporary societal demands. This pedagogical integration enables educators to design instructional activities that foster students' engagement with financial concepts, equipping them with the critical thinking and decision-making skills required for informed financial management in their future endeavors.

Moreover, the structured learning experiences facilitated by this approach allow students to actively explore, hypothesize, validate, and internalize mathematical concepts, particularly in relation to the graphical representation of the linear function $y=ax+b$ ($a \neq 0$). Beyond acquiring theoretical knowledge, students are afforded the opportunity to apply mathematical principles to analyze and resolve practical financial problems encountered in everyday life. The confluence of mathematics and financial education not only reinforces the real-world applicability of mathematical knowledge but also fosters greater student engagement and motivation. By contextualizing mathematical instruction within financial scenarios, this approach renders the subject more meaningful, accessible, and engaging for learners, thereby contributing to a more holistic and relevant educational experience.

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