



Preliminary Insights into the Advantages and Challenges of Teaching Natural Science: A Case Study from Ca Mau Province, Vietnam

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ABSTRACT: This preliminary study provides initial insights into the advantages and challenges of teaching the Natural Science subject under Vietnam's 2018 General Education Curriculum at secondary schools in Ca Mau Province. Using a qualitative exploratory approach, eight Natural Science teachers were purposively selected to ensure diversity in teaching experience and school context. Data were collected through semi-structured interviews and were analysed thematically following Braun and Clarke's (2006) six-step framework. Findings reveal that while several teachers expressed confidence and positive attitudes toward the integrated curriculum, they also encountered notable difficulties, such as limited laboratory facilities, insufficient specialisation, and student behaviour management. Some teachers highlighted advantages, including collegial support, adaptable teaching methods, and the relevance of the integrated approach. The results suggest a need for continuous professional development, enhanced teaching resources, and collaborative support networks among teachers. Although based on a small sample, these findings provide valuable preliminary evidence for understanding classroom realities in resource-constrained contexts and contribute to the improvement of integrated science education in Vietnam.

KEYWORDS: Natural Science, preliminary study, secondary education, teacher challenges, Vietnam.

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Introduction

In Vietnam's 2018 General Education Curriculum, the Natural Sciences subject integrates Physics, Chemistry, Biology, and Earth Sciences to develop students' scientific competencies, problem-solving abilities, and practical application skills (Ministry of Education and Training [MOET], 2018a). It emphasises inquiry-based learning and environmental responsibility to prepare globally competent citizens (MOET, 2018b). Vietnam's strong PISA science rankings (8th out of 65 countries in 2012 and 70th in 2015) highlight the effectiveness of its science education, which is comparable to systems in Canada and Finland (OECD, 2012, 2019). However, the 2018 curriculum's shift to competency-based teaching poses challenges, particularly in resource-constrained regions like Ca Mau, where limited facilities and training hinder implementation (Ca Mau Department of Science and Technology, 2024). . Studies have noted that interdisciplinary teaching pressures and facility shortages (16.8%) impede progress, despite the need for teachers to train teachers (Huynh et al., 2023; Nguyen & Do, 2024). This study examines the advantages and challenges faced by lower secondary students in Ca Mau, aiming to inform policy and reduce urban-rural disparities in Natural Sciences education.

Research Aim and Research Questions

This study aims to investigate and analyse the advantages and challenges lower secondary school teachers encounter in Ca Mau Province when teaching the Natural Sciences subject.

The study's findings respond to the following research questions:

1. What is the current situation of teaching Natural Sciences in lower secondary schools in Ca Mau Province?
2. What are the primary advantages experienced by teachers in delivering the Natural Sciences curriculum in this context?
3. What significant challenges do teachers face in teaching Natural Sciences, and what solutions do they propose to address them?

Methodology

Research Design: The study employed an in-depth interview method with eight teachers currently teaching Natural Science at several lower secondary schools in Ca Mau.

Participants: Eight Natural Science teachers from lower secondary schools in Ca Mau Province were selected using purposive sampling to ensure diversity in geographical locations and teaching conditions.

Data Collection: Qualitative data were collected through eight semi-structured in-depth interviews with Natural Science teachers from lower secondary schools in Ca Mau. All interviews were transcribed verbatim to prepare the dataset for thematic analysis.

Data Analysis: The interview data were manually coded and analysed with the support of Microsoft Excel 2019 using the thematic analysis approach. The process followed the six-phase framework proposed by Braun and Clarke (2006).

Research Results

The results are from qualitative interviews with eight natural science teachers from selected lower secondary schools in Ca Mau Province, Vietnam. Responses were grouped thematically, with percentages calculated based on the frequency of similar answers.

Current Situation

For Question 1 *“How do you evaluate the overall current situation of teaching and learning at your school?”*, evaluating the overall teaching reality at schools, responses were categorized as “Good” (4 responses, 50%), “Very Good” (3 responses, 37.5%), and “Needs Improvement” (1 response, 12.5%). For Question 2 *“What suggestions do you have to improve the effectiveness of teaching and learning in Natural Science subjects at secondary/high schools?”* on proposals to enhance natural sciences teaching and learning, categories included “No Suggestions” (5 responses, 62.5%) and specific recommendations: reducing class sizes to around 30 students and equipping full teaching devices (1 response, 12.5%), providing more funding for experiments (1 response, 12.5%), and professional training in non-specialized subjects (1 response, 12.5%) (Table 1).

Table 1

Current Situation in teaching Natural Sciences in Ca Mau province, Vietnam

Category	Question 2	
	Responses	Percentage
No Suggestions	5	62.5%
Class Size/Equipment Improvements	1	12.5%
Funding for Experiments	1	12.5%
Professional Training	1	12.5%

Advantages

For Question 3 *“What is the most significant advantage or facilitating factor that you have experienced in teaching Natural Science at your school?”*, on the most prominent advantages experienced in Natural Sciences teaching, responses were grouped as “No Opinion/No Advantages” (5 responses, 50.0%) and specific advantages: support from colleagues (1 response, 12.5%), availability of TVs in all classrooms (1 response, 12.5%), finding suitable teaching methods for students (1 response, 12.5%), and cohesion among Natural Sciences subjects (noted in one response but overlapping with methods). For Question 4 *“What suggestions or recommendations do you have to make better use of the existing advantages and to further enhance favorable conditions for future Natural*

Science teaching activities?" on proposals to leverage and enhance advantages, categories included "No Opinion" (4 responses, 50.0%) and suggestions: providing full labs and experimental equipment (1 response, 12.5%), equipping teaching devices (1 response, 12.5%), increasing experiment time (1 response, 12.5%), and leveraging knowledge similarities across subjects (1 response, 12.5%) (Table 2).

Table 2

Advantages in teaching Natural Sciences in Ca Mau province, Vietnam

Category	Question 3		Question 4	
	Responses	Percentage	Responses	Percentage
No Opinion/No Advantages	4	50.0%	4	50.0%
Colleague Support	1	12.5%	N/A	N/A
Classroom Equipment (e.g., TVs)	1	12.5%	1 (General Equipment)	12.5%
Suitable Teaching Methods	1	12.5%	N/A	N/A
Subject Cohesion	1	12.5%	1 (Knowledge Similarities)	12.5%
Labs/Equipment	N/A	N/A	1	12.5%
Increase Experiment Time	N/A	N/A	1	12.5%

Difficulties

For Question 5, *"Could you describe the main difficulties you have encountered in teaching the Natural Science subject?"*, the responses highlighted several key challenges in teaching Natural Science. Reported difficulties included "No Opinion" (2 responses, 25.0%) and student behaviour issues, such as students not completing homework (2 responses, 25.0%). Other challenges comprised a lack of experimental tools and inadequate laboratory facilities (3 responses, 37.5%), teaching only one component of the subject (e.g., Chemistry) (1 response, 12.5%), use of outdated teaching tools (1 response, 12.5%), low student self-discipline and insufficient facilities (e.g., poor internet access) (1 response, 12.5%), non-specialized knowledge gaps among teachers (1 response, 12.5%), and student boredom due to being taught by the same teacher (1 response, 12.5%) (see Table 3).

Table 3

Difficulties in teaching Natural Sciences in Ca Mau province, Vietnam

Category	Question 5	Question 6
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	Responses	Percentage	Responses	Percentage
No Opinion	2	25.0%	3	37.5%
Student Behavior Issues	2	25.0%	1	12.5%
Lack of Tools/Labs/Facilities	3	37.5%	1	12.5%
Specialized Knowledge Gaps	N/A	N/A	2	25%
Teacher Overload	1	12.5%	1	12.5%

For Question 6, “What solutions would you suggest to address these difficulties and to improve the quality of Natural Science teaching at your school?”, responses included “No Opinion” (3 responses, 37.5%) and several proposed measures: continuous professional development for teachers (1 response, 12.5%), strengthening student discipline and learning motivation (1 response, 12.5%), investing in facilities and reducing class sizes (1 response, 12.5%), enhancing knowledge exchange among teachers (1 response, 12.5%), and assigning multiple teachers to the subject (1 response, 12.5%) (see Table 3).

Discussion

The predominantly positive assessment (87.5% rating teaching as good or very good) suggests effective foundational Natural Sciences teaching, likely driven by the 2018 General Education Program’s focus on integration (Nguyen et al., 2020). However, the call for better facilities and training reflects regional gaps, similar to those in northern Vietnam (Tran et al., 2025). Advantages like colleague support and basic equipment (e.g., TVs) facilitate engagement, akin to blended learning benefits in STEM (Nguyen et al., 2025). Proposals for labs and experiment time could enhance student creativity, as seen in global STEM initiatives (Nguyen, 2024).

Difficulties, primarily resource shortages and expertise gaps, mirror national challenges in the field of Natural Sciences teaching (Nguyen & Pham, 2021). Student behaviour issues, linked to exam-oriented pressures, reduce engagement, while knowledge gaps highlight training needs (Dang, 2024). Proposed solutions, such as infrastructure investment and teacher collaboration, align with studies advocating competency-based reforms (Luu, 2024; Pham & Tran, 2025). These findings underscore the need for targeted interventions in underserved areas like Ca Mau to align with Vietnam’s STEM education goals (Nguyen, 2020; Tran et al., 2025).

Conclusions

This preliminary study examined the teaching of Natural Science under Vietnam’s 2018 General Education Curriculum in Ca Mau Province. Teachers showed adaptability and positive attitudes, yet challenges persist in facilities, training, and subject expertise. Enhancing professional development, resources, and collaboration is essential for improving teaching quality. Despite the small sample, the findings offer valuable insights for strengthening Natural Science education in similar contexts across

Vietnam.

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