

Dạy học dự án trong môn Khoa học lớp 4

TÓM TẮT

Đáp ứng chương trình Giáo dục phổ thông mới là dạy học theo định hướng phát triển năng lực, những năm gần đây, đã có nhiều công trình nghiên cứu giáo dục trao đổi về phương pháp dạy học, hình thức dạy học tích cực, trong đó dạy học theo dự án (DHDA) là một trong những phương pháp được vận dụng vào dạy học ở bậc tiểu học ngày càng rộng rãi. Trong DHDA, người học chủ động, sáng tạo và hợp tác trong học tập, vì vậy sẽ góp phần hình thành các năng lực tự chủ và tự học, giao tiếp và hợp tác, giải quyết vấn đề và sáng tạo. Môn Khoa học lớp 4 có 6 chủ đề, chủ yếu thuộc các lĩnh vực khoa học tự nhiên, nên DHDA có thể vận dụng hiệu quả vào một số nội dung bài học ở tất cả các chủ đề, góp phần hình thành các phẩm chất yêu nước, nhân ái, chăm chỉ, trung thực và trách nhiệm cho học sinh.

Từ khóa: Dạy học dự án; Khoa học lớp 4; tiểu học.

Project-based learning in grade 4 science education

ABSTRACT

In alignment with the new general education curriculum, which emphasizes competency-based teaching and learning, numerous educational studies in recent years have examined active teaching methods and approaches, among which project-based learning (PBL) has been gaining popularity in primary education settings. PBL encourages student autonomy, creativity, and collaboration in learning, thereby contributing to developing essential competencies such as self-regulation and independent learning, communication and collaboration, problem-solving and innovation. The Grade 4 Science curriculum has six themes, primarily within the field of natural sciences. Due to its features, PBL can be effectively utilized in different lesson content across all themes, promoting the cultivation of essential values such as patriotism, compassion, diligence, integrity, and responsibility among students.

Keywords: *Project-based learning (PBL); Grade 4 science; Primary education.*

1. INTRODUCTION

The new general education curriculum is designed with a competency-based approach. Competency is characterized as the effective integration of knowledge, skills, behaviors, and attitudes within learners. To advance a comprehensive growth of students' competencies, it is essential to cultivate the three primary competencies—self-regulation and independent learning, communication and teamwork, and problem-solving and creativity across all courses. Additionally, depending on each subject and educational level, specific competencies such as linguistic competency, mathematical competency, scientific and social inquiry competency, digital literacy, physical competency, and technological competency should be systematically and methodically developed. These efforts aim to nurture five key qualities of patriotism, compassion, diligence, integrity, and responsibility as outlined in the curriculum's objectives.

To foster the necessary competencies and virtues in students, the curriculum is organized with lessons structured around four key activities namely engagement, exploration, practice, and application. Throughout these activities, educators are urged to implement teaching strategies that actively engage students in the

learning process, one particularly effective approach is project-based learning (PBL), which helps the competency-based framework in a meaningful and practical manner.

Project-based learning (PBL) was developed by American educator and philosopher John Dewey (1859-1952) and originated in the disciplines of medicine and education. Dewey advocated for teaching pupils learning processes through the establishment of specific projects and the selection of appropriate solutions to attain successful outcomes.¹ This approach was first implemented by Howard Barrows, an American professor of neurology at McMaster University (Canada), in 1969.^{1,2} Since the late 16th century, the concept of "Project" has been used in Italian architectural schools and subsequently implemented in several universities in France, the United States, and other European countries. In the early twentieth century, American educators laid the theoretical foundation for the Project Method, recognizing it as a student-centered teaching style that promotes the development of numerous competencies at various educational levels.³

The Science subject at the primary level encompasses six main themes of Matter, Energy, Plants and Animals, Fungi and Bacteria, Humans and Health, and Ecology and the Environment⁴. This subject integrates fundamental knowledge

from various natural sciences, including physics, chemistry, and biology - inherently experimental disciplines. Therefore, implementing PBL in lesson activities, particularly in the application phase, is essential for fostering students' qualities and competencies. Given this context, we recognize the necessity of researching "Project-Based Learning in Grade 4 Science Education."

2. MAIN CONTENT

2.1. The role of project-based learning in Science

A project is a type of research that is carried out to be applied practically to accomplish particular economic and social outcomes. It is highly application-oriented and operates within defined constraints of time and resources.

Project-based learning (PBL) is a teaching method in which students engage in

complex learning projects that combine theoretical knowledge with practical application, resulting in concrete outcomes that can be presented. These assignments necessitate a high degree of student autonomy and are carried out under the supervision of teachers. Throughout addressing real-life situations or scenarios linked with the curriculum, students acquire knowledge and develop critical skills by integrating theory with hands-on practice. Group work is the primary modality of instruction in this approach.^{5,6} As a result, PBL promotes vital abilities such as self-regulation and self-directed learning, communication and teamwork, problem-solving, and creativity, all of which help to shape well-rounded, responsible citizens.

2.2. Project-based learning process

A learning project can be implemented using the following steps:

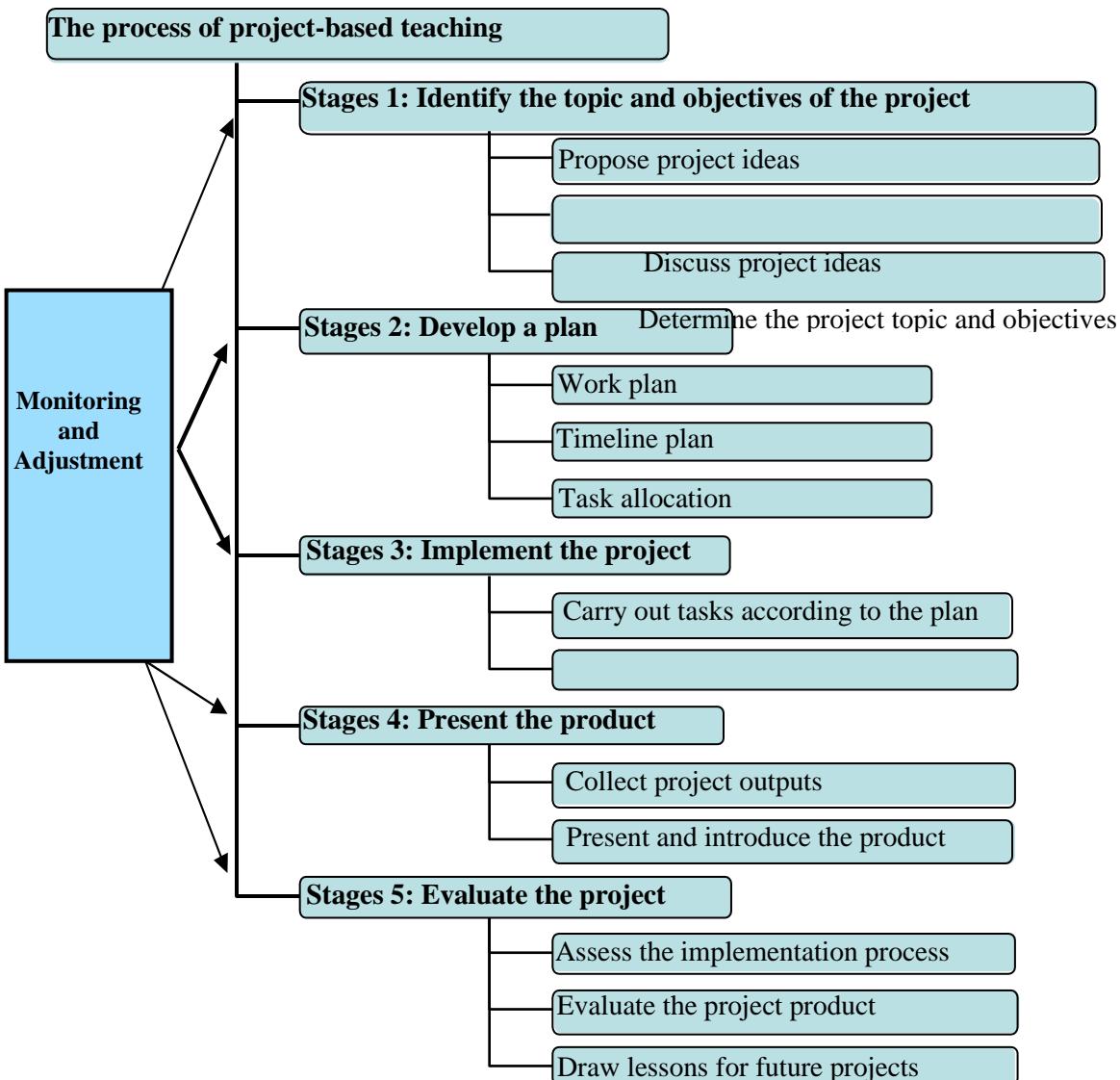


Figure 1. Project-based learning process.³

For primary school children, their ability to work independently is still growing. As a result, teacher assistance is required for stages 1 and 2 to ensure PBL efficacy.

2.3. System of lessons/project-based learning (PBL) activities in grade 4 science

The new general education curriculum is implemented through three parallel sets of textbooks: Kite wing, Connecting knowledge and life, and Creative horizons. While each set differs

in presentation and design, they all adhere to the standardized content framework established by the Ministry of Education and Training. Therefore, this study focuses on organizing lessons and activities suitable for PBL using the Kite wing textbook series as an illustrative example (refer to Table 1), with the same methodology applied to the other textbook sets.

Table 1. System of lessons/project-based learning (PBL) activities in grade 4 science *Kite wing Textbook Series*.

(With inclusion of six themes with 23 knowledge-providing lessons and six review lessons)

Theme	Lesson title	PBL activities
MATTER	Lesson 3. Protecting water resources and Methods of Water Purification (2 periods)	Project: Designing a water filtration system
ENERGY	Lesson 7. Light transmission (2 periods) Lesson 10. Sound in daily life (2 periods) Review of the energy theme (1 period)	Project: Building a mini movie theater Creating a simple sound-producing device Planting trees in the schoolyard to reduce noise pollution
PLANTS AND ANIMALS	Review of the plants and animals theme (1 period)	Producing fermented products to understand the role of beneficial bacteria (e.g., yogurt, pickled vegetables)
FUNGI AND BACTERIA	Review of the fungi theme (1 period)	Creating a collection of beneficial fungi
HUMANS AND HEALTH	Lesson 18. Nutrition and diet (4 periods) Review of the humans and health theme (1 period)	Designing a one-week meal plan for yourself and family Designing a meal plan for friends in cases of nutritional imbalance
ORGANISMS AND THE ENVIRONMENT	Review of the Organisms and environment Theme (1 period)	Creating a model of the food chain and food web

Overall, Science lessons are structured around four core activities: Engagement, exploration, practice, and application. PBL is most effective when employed during the practice or application phases, allowing students to reinforce their knowledge and apply it in real-life situations.

2.4. Illustration of project-based learning (PBL) Activities

Example 1: Lesson 10 – Sound in daily life

Integration of PBL in the application phase: Developing a sound-producing device.

- Objectives: Apply knowledge of vibrations as the fundamental cause of sound production.
- Implementation steps:

+ Step 1: Define the project theme and objectives

Divide the class into four groups. Each

group discusses how to make a sound-producing device out of recycled materials, transforming waste into usable products (for example, children's toys).

+ Step 2: Develop a plan

Each group chooses the product they will make, plans the process, and allocates members' duties to obtain the necessary materials. A representative from each group presents their idea to the class to ensure diversity and avoid duplication of projects.

+ Step 3: Execute the project

During the second period of the lesson, students carry out their projects according to the plan agreed upon in the first period.

Group 1: Create a drum using an aluminum can. The can is cut open, with plastic film used for the drumhead and a bamboo stick as the drumstick.

Group 2: Build a guitar with foam and metal wires. The foam is cut to the shape of a

guitar, with wires serving as strings.

Group 3: Craft a flute from bamboo tubes.

Group 4: Build a lithophone (stone musical instrument).

+ Step 4: Present the products

Each group displays their tools, explains the production process, and shows how their product produces sound. From there students consolidate their understanding that *sound is produced by the vibration of objects*.

+ Step 5: Evaluate the Project

Students and the teacher assess each group's work, with emphasis on the construction process, finished result, and capacity to describe and analyze sound generation via vibrations.

Recognition and rewards are provided, followed by contemplation on how to improve future classes.

- Conclusion: During the application phase, students learn crucial competencies: autonomy and self-learning (independently designing and executing their projects), communication and collaboration (group discussions, material collection, and task delegation), problem-solving and creativity (innovating and explaining their creations and results); promotes important character attributes such as diligence, honesty, and accountability. Students also cultivate an awareness of environmental protection, fostering a sense of national pride through sustainable actions.

Example 2: Review lesson on Organisms and the environment

- Objectives: Apply knowledge to better comprehend the relationships between creatures in their habitats; raise awareness about the need of animal protection and conservation in their natural environments.

- Implementation steps:

+ Step 1: Define the project theme and objectives

Separate the students into four groups, each of which have to develop a natural food chain and web.

+ Step 2: Develop a plan

Each group discusses their idea, decides on their approach, and assigns duties to collect the necessary supplies. Representatives from each group present their ideas to the class to promote diversity and avoid duplication.

+ Step 3: Execute the project

Groups work on their projects according to the agreed-upon plan.

Group 1 uses foam models, drawings, or printed images to depict terrestrial food chains and food webs.

Group 2 illustrates aquatic food chains and webs with similar materials.

Group 3 represents local food chains and food webs in their surroundings.

Group 4 demonstrates wildlife food chains and food webs.

+ Step 4: Present the products

Groups show their models, clarify essential ideas, and explore the significance of food chains and webs. Students emphasize the importance of plants in ecosystems and promise to support environmental protection.

+ Step 5: Evaluate the project

Students and teachers evaluate each group's work based on method, product, and capacity to communicate the ecological relevance of creatures.

Compliments are offered, followed by suggestions for improving future lessons.

- Conclusion: The adoption of PBL in the review lesson on Organisms and the environment encouraged students' abilities in independence and autonomous learning (independently conceptualizing and executing projects aligned with the lesson objectives), interaction and cooperation (engaging in discussions, planning methods, and collecting or crafting visual representations of organisms using materials such as foam), resolving issues and creativity. This approach helps students comprehensively build their essential qualities, as indicated in the new general education curriculum's objectives.

The preceding examples showcase the utilization of PBL in two types of lessons: one focusing on teaching new knowledge and one serving as a review at the end of a topic. Employing these examples and the content standards indicated in Table 1, teachers can develop and execute acceptable learning projects across a range of subjects, lessons, and instructional activities, notably at the primary education level and also in other educational stages.

3. CONCLUSION

- Project-based learning in grade 4 science is an active teaching approach that promotes the objectives of the new general education curriculum: the comprehensive development of five core virtues - patriotism, compassion, diligence, integrity, and responsibility - while encouraging three key competencies: self-regulation and self-directed learning, communication and collaboration, and problem-solving and creativity. Additionally, PBL helps students develop subject-specific competencies, including scientific reasoning, environmental inquiry, and acquired knowledge and skills application in practical contexts.

- In grade 4 science, PBL can be implemented in both lessons introducing new knowledge and review sessions. The structure of the new general education curriculum, particularly the science curriculum, is well-suited for PBL, as each lesson includes hands-on practice and application activities and spans 2–3 class periods, enhancing the quality of instruction

while fostering a stronger connection between classroom learning and real-life experiences.

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