



Applying the Project-Based Learning Model within the CDIO Framework to the Course *Methods of Research and Teaching Vietnamese History*

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ABSTRACT: This paper explores the application of the Project-Based Learning (PBL) model within the CDIO (Conceive-Design-Implement-Operate) framework in the course *Methods of Research and Teaching Vietnamese History*. The study aims to enhance students' active learning capacity and teaching competence by creating authentic learning products. Based on the seven-step process of PBLWorks' Gold Standard model, the paper outlines the implementation stages, including project design, standard alignment, team culture development, activity management, knowledge scaffolding, learning assessment, and consultation. The project required students to design a complete teaching product—consisting of a project logbook, poster, presentation file, and teaching model—throughout the semester under continuous instructor guidance. The findings indicate that applying PBL within the CDIO framework not only transforms students' learning attitudes from passive to proactive but also strengthens their teamwork, problem-solving, and creativity skills. For instructors, it fosters professional growth and innovation in teaching practice. Despite specific challenges such as time management and resource allocation, this approach demonstrates strong potential for improving both learning outcomes and teaching quality in higher education, especially in pedagogical training programs.

KEYWORDS: CDIO approach, higher education, project-based learning, teaching innovation.

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Introduction

In the context of Vietnam's higher education shifting from knowledge transmission to competency-based learning, the renewal of teaching methods has become an urgent necessity. Traditional approaches, which primarily emphasise memorisation and reproduction of knowledge, have shown clear limitations in fostering students' critical thinking, creativity, and professional competencies. In contrast, modern pedagogical models such as Project-Based Learning (PBL) and the CDIO approach (Conceive – Design – Implement – Operate) are recognised as effective frameworks for enhancing learners' autonomy, creativity, and problem-solving abilities.

Based on this educational demand, the present study focuses on applying the PBL model within the CDIO framework to the course *Methods of Research and Teaching Vietnamese History*. The aim is to evaluate the effectiveness, advantages, and challenges of this implementation and to propose practical lessons that can be widely applied in university teaching contexts.

Research Aim

This study aims to explore the effectiveness of applying the Project-Based Learning (PBL) model within the CDIO framework to the course "*Methods of Research and Teaching Vietnamese History*," focusing on improving students' learning outcomes, teaching competencies, and engagement.

Research Questions

1. How can the CDIO-based Project-Based Learning model be effectively implemented in the course *Methods of Research and Teaching Vietnamese History*?
2. What impacts does the application of the PBL model have on students' learning outcomes and teaching competencies?
3. What challenges and practical lessons emerge from the implementation process for both lecturers and students?

Research Results

Comparison between Traditional and Modern Teaching Methods

According to Lewis (2019), Bloom's Taxonomy not only describes the cognitive process but also serves as a framework for developing learner-centred teaching methodologies. Based on Bloom's cognitive hierarchy, learners' thinking abilities are categorised into six levels, comprising three lower-order thinking skills—Remembering, Understanding, and Applying—and three higher-order thinking skills – Analysing, Evaluating, and Creating.

In the traditional teaching model, the instructor is positioned at the centre of the knowledge delivery process, while students primarily play a passive, receptive role. Learning activities primarily focus on memorising and reproducing provided information, with the main objective of completing

examinations, assessments, or applying knowledge in a limited and mechanical manner. As most class time is devoted to content transmission, learners have few opportunities to develop higher-order thinking skills such as analysis, evaluation, and creativity.

In contrast, modern teaching approaches redefine classroom roles by placing the learner at the centre, where the teacher acts as a facilitator, mentor, and guide. The goal of these approaches is to stimulate critical thinking, creativity, and self-directed learning, thereby enabling students to construct knowledge and develop comprehensive competencies actively.

Among modern pedagogical approaches, Project-based Learning is one of the most widely implemented models, as it empowers learners and creates a learning environment closely connected to real-life contexts. Through this approach, learners can develop higher-order thinking skills that meet the demands of 21st-century education.

Introduction to Project-based Learning

According to the CDIO (Conceive – Design – Implement – Operate) framework, project-based learning (PBL) is a practice-oriented pedagogical approach in which students acquire disciplinary knowledge and develop essential competencies through the design, implementation, and evaluation of their own learning projects. These projects are typically derived from real-world problems closely related to professional contexts or societal challenges (CDIO Initiative, n.d.).

The core of PBL does not lie in the final product itself, but in the learning process that takes place throughout the project's development. During this process, learners work collaboratively in teams, engage in discussions and critical reflections, and share individual experiences—thereby cultivating teamwork, creative thinking, and problem-solving abilities. This approach enables students to “learn by doing,” fostering critical thinking and soft skills—essential components of modern higher education.

It is essential to distinguish between “*doing a project*” and “*learning through a project*”:

A project aims to produce a complete product or a concrete solution.

Learning through a project, by contrast, focuses on the process of inquiry, experience, and knowledge construction, emphasising the development of learners' competencies rather than tangible outcomes.

Therefore, PBL is not merely a teaching method but a modern educational philosophy that empowers students to become active agents in knowledge creation—fully aligned with the learner-centred orientation of contemporary higher education reform.

Comparison between “Doing a Project” and “Project-Based Learning”

Although the two concepts of “*doing a project*” and “*project-based learning*” are often used interchangeably in teaching practice, they differ fundamentally in terms of objectives, implementation,

and the learner's role. According to Thomas (2000), *doing a project* is typically employed as a final course assignment, in which students complete a task at the end of the semester and are assessed primarily based on the quality of the final product. In contrast, *Project-Based Learning* is an integrated pedagogical approach implemented throughout the learning process. It is designed from the beginning of the course, allowing students to acquire knowledge while simultaneously developing higher-order thinking skills through the conception, execution, and evaluation of their learning projects (CDIO Initiative, n.d).

This distinction is also reflected in the roles of teachers and students. In the project implementation model, instructors act as directors, controllers, and evaluators of outcomes, while students primarily follow the given instructions. In contrast, within the Project-Based Learning framework, learners become the central agents in the process of knowledge construction, whereas instructors serve as facilitators and mentors (Blumenfeld et al., 1991). PBL requires mandatory teamwork, fostering collaboration, sharing, and peer critique, thereby cultivating communication skills and systems thinking. Notably, the outcomes of PBL projects are often presented publicly to the academic community or external partners, rather than being confined to the classroom, which enhances both practical value and social feedback (see Table 1).

Table 1

Comparison between Project Work and Project-Based Learning

Aspect	Project Work	Project-Based Learning
Implementation timing	Assigned at the end of the course as a final assignment	Introduced at the beginning of the course and implemented throughout the learning process
Assessment objective	Evaluation based solely on the final product	Evaluation of both the learning process and the final outcomes
Role of instructor	Acts as a director and controller of the working process	Serves as a facilitator and mentor, fostering learner autonomy
Role of students	Passive participants who follow instructions	Active learners who explore and construct knowledge
Working format	Can be done individually	Requires mandatory teamwork
Presentation of results	Limited to classroom presentations	Publicly presented to the academic community or external partners

Source: Compiled by the author based on Thomas (2000), Blumenfeld et al. (1991), and CDIO Initiative (n.d.).

The Benefits of Project-Based Learning

The Project-Based Learning approach provides multidimensional benefits for both learners and educators. For students, PBL fosters a fundamental shift in learning attitudes—from passively receiving knowledge to actively exploring and applying it. Knowledge is constructed through the process of project implementation, becoming dynamic and contextually relevant rather than remaining abstract concepts in textbooks. In addition to developing professional competencies, students also cultivate

essential 21st-century skills, including critical thinking, collaboration, creativity, and effective communication (Blumenfeld et al., 1991).

For educators, PBL enhances pedagogical capacity and professional identity by transforming the teacher's role from a transmitter of knowledge to a designer, facilitator, and evaluator of learning activities. This method simultaneously encourages interdisciplinary collaboration, establishing professional networks among instructors, academic institutions, and industries—thus bridging education with real-world demands. Through organising interdisciplinary projects, teachers can help students integrate multi-domain knowledge into their learning processes, thereby strengthening problem-solving skills and adaptability in an increasingly globalised context.

Advantages and Challenges of Project-Based Learning

Project-Based Learning is regarded as a modern pedagogical model that enables learners to develop comprehensive competencies through the implementation of authentic, practice-oriented tasks. Numerous studies have affirmed that PBL not only enhances students' acquisition of knowledge but also strengthens their problem-solving abilities, critical thinking, and teamwork skills (Thomas, 2000; Bell, 2010; CDIO Initiative, n.d). However, alongside these advantages, the approach also presents several challenges in practical implementation.

Advantages:

- PBL projects are highly authentic and closely connected to professional practice, allowing students to “learn by doing” and to construct living, applicable knowledge rather than relying solely on memorisation of theoretical concepts.
- The method encourages interdisciplinary integration, thereby reducing assessment workload while maintaining the quality of learning outcomes.
- Because it incorporates a variety of learning activities (research, design, presentation, peer review, etc.), PBL accommodates diverse learning styles among students.
- Implementing PBL increases learner engagement, fostering autonomy, creativity, and a stronger sense of responsibility for their own learning outcomes.

Challenges:

- PBL requires significant effort from instructors in designing, monitoring, and evaluating projects, while students must demonstrate high levels of self-management, collaboration, and initiative (Thomas, 2000).
- Group-based learning activities demand effective communication and coordination among team members, which can become difficult if responsibilities are unevenly distributed.

- Due to the dynamic nature of PBL, scheduling meetings and consultations between instructors and students often needs to be flexible and may extend beyond regular class hours.
- Some projects require additional material resources, equipment, or financial investment, making implementation more complex within the constraints of institutional conditions (CDIO Initiative, n.d).

Practical Application: Steps for Implementing Project-Based Learning

According to the *Gold Standard PBL: Teaching Practices* proposed by PBLWorks, the implementation process of project-based learning comprises seven fundamental steps, which serve as a standard framework to ensure teaching quality and effective learning outcomes (PBLWorks, n.d.).

Step 1. Design and Plan

Instructors take the initiative to develop or adapt an existing project to fit the institution's educational context and the characteristics of learners. At this stage, the teacher designs the entire learning framework—from initiation and implementation to evaluation—while listening to students' voices and incorporating their feedback to make the project more relevant and realistic.

Step 2. Align to Standards

Projects must be designed based on clear assessment standards that reflect students' competencies, knowledge, and understanding within the subject area. PBLWorks (n.d.) proposes seven quality assurance criteria, including:

1. A challenging and meaningful problem or question;
2. Encouragement of inquiry and exploration;
3. Authenticity and real-world relevance;
4. Student voice and choice;
5. Reflection and self-evaluation;
6. Opportunities for revision and improvement;
7. Connection to and impact on the community

Step 3. Build the Culture

Instructors should foster an open and collaborative learning environment that encourages students to develop independence, creativity, inquiry skills, and teamwork. This culture of learning helps students recognise the value of quality outputs and personal responsibility within the collective.

Step 4. Manage Activities

The instructor acts as a facilitator, collaborating with students to build schedules, assign tasks, and set key milestones and deadlines. At the same time, the teacher provides support in identifying and utilising resources necessary for completing the project and sharing its outcomes within the learning community.

Step 5. Scaffold Student Learning

Teachers guide students through mini-lessons and provide the necessary tools, resources, and learning strategies to help them achieve project goals. This scaffolding process should be flexible, ensuring that students develop their individual competencies while maintaining autonomy and ownership of their learning journey.

Step 6. Assess Student Learning

Assessment is conducted throughout the project, combining formative assessment (ongoing evaluation) and summative assessment (final evaluation). Moreover, students are encouraged to participate in self-assessment and peer assessment, which strengthen their critical thinking and self-awareness.

Step 7. Engage and Coach

Instructors serve as mentors and coaches, continuously motivating, providing feedback, and supporting students whenever adjustments or new skills are needed. Encouragement and recognition of effort help maintain students' enthusiasm, creativity, and perseverance throughout the project implementation process.

Practical Application of the PBL Model in Teaching the Course "Methods of Research and Teaching Vietnamese History"

Within the framework of the course "*Methods of Research and Teaching Vietnamese History*," the instructor implemented the Project-Based Learning model in combination with the CDIO framework to enhance the applicability of the course and develop the professional competencies of students in history teacher education.

Course duration: 30 periods.

Project Requirements: Students were assigned the task of applying the CDIO model (Conceive – Design – Implement – Operate) to design a creative, practical, and pedagogically applicable lesson product. The project spanned the entire course—from the initial ideation stage to the completion and presentation of the final product—under the guidance and mentorship of the course instructor.

Deliverables:

1. **Project Journal and Report:** A complete record of the project's development process, from ideation and task allocation to reflection after each phase.

2. Group Poster: A visual representation introducing the group's identity, project objectives, product concept, and implementation process.
3. Presentation File: A summary of the content, evidence of learning outcomes, and demonstration of how the CDIO framework was applied in designing the lesson.
4. Final Product or Model Prototype: The outcome of the project—such as an e-learning lesson, a visual teaching model, or a teaching aid designed based on Vietnamese History content.

Educational Outcomes: The integration of PBL and CDIO in the course enabled students not only to reinforce disciplinary knowledge but also to develop essential competencies in designing, organising, and evaluating history teaching activities. This approach fosters creativity, scientific thinking, and practical relevance to the current context of general education in Vietnam.

Practical Experience in Implementing the Project-Based Learning (PBL) Model in the Course "Methods of Research and Teaching Vietnamese History"

Based on the theoretical framework of the Gold Standard PBL (PBLWorks, n.d.), the author implemented the Project-Based Learning model in the course "*Methods of Research and Teaching Vietnamese History*" with a total duration of 30 periods. The implementation process followed seven specific steps, combining theoretical instruction with practical teaching experience.

Step 1. Design and Plan

The project was implemented simultaneously across all class sections. Building upon a standardised model provided by the Department, the instructor both applied the sample project and designed a new one based on PBL criteria, ensuring feasibility, learner appropriateness, and alignment with course learning outcomes. This process required creativity, experience, and the ability to integrate learning objectives with the students' professional competencies.

Step 2. Align to Standards

The instructor referred to the core standards proposed by PBLWorks – including challenging problems, authenticity, student agency, and reflection – to ensure that the project accurately reflected the students' cognitive abilities and skills throughout the learning process.

Step 3. Build the Culture

At the initial stage, students in each group were required to establish a team contract, outlining personal information, strengths, weaknesses, individual and collective goals, as well as agreed-upon working principles. This step was considered a key factor in reinforcing commitment, responsibility, and teamwork discipline, particularly for newly formed groups.

Step 4. Manage Activities

The project was conducted over three months, with clearly defined milestones for progress reporting. The instructor allocated the last 30-45 minutes of each class for progress discussions and evaluations of each group's performance against output objectives. Periodic progress monitoring not only helped students maintain motivation but also enabled the toinstructor by make timely adjustments whenever issues arose.

Step 5. Scaffold Student Learning

Between reporting sessions, thematic lessons were organised to pstudents with rovide the necessary knowledge, skills, andudents to continue developing their projects. The instructor emphasised just-in-time learning, ensuring that support was contextually relevant and directly addressed the challenges students faced during project implementation.

Step 6. Assess Student Learning

A detailed evaluation rubric was developed by the instructor, covering both the final product and the learning process. In addition to the instructor's assessment, students participated in peer assessments between groups and intra-group evaluations, ensuring objectivity and fostering reflective thinking.

Step 7. Engage and Coach

Throughout the project, the instructor acted as a facilitator and mentor, providing ongoing support via online communication channels outside of class hours to ensure timely feedback. However, this support was limited to consultation—posing questions, offering suggestions, and providing direction—rather than direct intervention in the product or decision-making process. This approach maintained student autonomy while maximising their creativity and individual responsibility.

Conclusion

The Project-Based Learning model represents an advanced and modern pedagogical approach that clearly embodies the philosophy of learner-centred education in higher education. The application of this model to courses, training modules, or academic programs at the departmental, faculty, or institutional level significantly contributes to innovating teaching and learning methods, thereby developing learner competencies, enhancing creativity, and promoting autonomy in learning.

However, the process of implementing PBL in practice inevitably faces various difficulties and challenges, ranging from design and organisation to assessment and ensuring sufficient resources and time. These limitations necessitate further research, experimentation, and contextual adaptation to accommodate the specific characteristics of each course and group of students.

In addition to mastering the theoretical foundations discussed in this paper and reflecting on the author's practical example, instructors are encouraged to flexibly integrate PBL and Inquiry-Based

Learning (IBL) models according to the specific conditions of their classes and the capacities of their departments. A creative and selective application of these models not only helps achieve course learning outcomes but also enhances teaching quality, stimulates engagement and collaboration, and fosters self-directed and research-oriented learning among students in today's modern educational environment.

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