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Integrating Inquiry-Based and Project-Based Learning: A New Model to Enhance Students' Teamwork, Skills, and Critical Thinking

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Abstract

Nowadays collaboration and critical thinking have become indispensable across classrooms and workplaces. Accordingly, this study is conducted to bring the development of such capacities into perspective by reporting a systematic review of literature on PjBL and IBL studies indexed between 2014 and 2024 in the SCI and SSCI databases. Eventually, nine high-quality articles were selected. The synthesis of review indicates that PjBL is largely outcome-oriented which means that the students develop comprehensive problem-solving competence through project design and enactment in the process of problem definition, solution planning, project execution, and evaluation of results. By contrast, IBL is organized around the inquiry process as such, emphasizing the strengthening of autonomous learning through problem posing, investigative research, and data analysis, whereas the way it is put into practice is normally shaped by the design of support systems and the purposeful use of educational technologies. In the light of such insights, we propose an integrated model for teaching that blends PjBL and IBL through five connected elements: constructing authentic learning contexts, driving learning with projects, enabling collaborative in-depth inquiry, fostering dynamic interaction and knowledge sharing, and employing multidimensional assessment alongside continuous reflection. That model aims to provide a practical framework for educators to help students enhance teamwork skills and critical thinking by means of practical engagement and deep reflection. However, the study is limited by the literature review method and lacks empirical verification. Future research should focus on empirical studies, optimize search strategies, and address individual student differences and technological integration to improve the teaching model and enhance educational quality.

Keywords: Critical Thinking, Instructional Model, Inquiry-Based Learning, Project-Based Learning, Teamwork Skills

Introduction

In today's educational and employment settings, the use of excellent teamwork skills and critical thinking is more in demand than ever before. As the globe gains unprecedented ties, problem resolution in teams with people from different backgrounds is recognized as the absolute key competency. Teamwork is a concept that entails both effective communication and collaboration along with the working capacity with people from a wide scope of backgrounds and cultures (Zainuri & Huda, 2023). On the contrary, logical reasoning is based on the capacity to break down, assess, and integrate information to arrive at useful conclusions (Hyytinen et al., 2021).

These abilities collectively form the basis for a workforce that has the flexibility to respond to the demands of a constantly shifting operating environment. These specific skills already have their nation in primary and secondary schools. It is taught right from the start. Teaching methods also impact students' learning processes significantly. In the field of education, it has been common for the last couple of decades for researchers and practitioners to look towards the Inquiry-Based Learning (IBL) and Project-Based Learning (PjBL) methods, which aim to stimulate an active role of the learners in the process of education. The distinctive design of these teaching methodologies allows students to move beyond rote learning to more active engagement in the ongoing learning process.

IBL is generally described as the process of learning whereby students identify and develop causal relations through hypothesis setting and testing using experimentation or observation, largely emulating the operation of a scientist in real life. This is, therefore, in line with promoting an active and constructive approach toward learning, whereby at all times, students are encouraged to construct rather than passively retain pieces of knowledge. The inquiry cycle in this case is particularly useful in fostering certain fundamental cognitive competencies, such as critical thinking developed through the processes of questioning, organizing and evaluating evidence, and drawing conclusions independently. Empirical research also indicates that engagement in IBL can enrich students' teamwork skills as well as their reasoning skills.

In contrast, PjBL extends a learner-centered pedagogy that foregrounds self-determination, sensitivity to context, collaboration, communication, and reflection (Kokotsaki et al., 2016). One of the distinguishing features of PjBL is the consistent emphasis it places on teamwork. Students work on elongated projects, for which they need to maintain continuous coordination. During this period, they not only learn knowledge about their disciplines but also develop interpersonal and process skills. In fieldwork, problem-solving, or at the final presentation of results, PjBL always places learners in situations where they must genuinely cooperate. Hence, students who receive instruction through PjBL usually exhibit better competence in collaboration and critical thinking compared to those from other, more traditional settings of learning (Cortázar et al., 2021; Melguizo-Garín et al., 2022).

Although the number of scientific studies related to PjBL and IBL has been growing, empirical research shows that these approaches in teaching help students to develop their skills in subject areas relevant to such learning. But the academic world has come to a consensus that applying a single-minded teaching approach has its own limitations. Besides, a growing body of research indicates that the integration of different teaching methods may potentially improve the quality of teaching (Connolly et al., 2023; Sanchez-Gomez, 2022).

Combining these two methods allows each to leverage its strengths, better promoting the development of students' teamwork skills and critical thinking. However, few studies propose a model that combines PjBL and IBL. The PjBL method lays more emphasis on knowing its own process through actual knowing, thus more devoted to the improvement of students' on-hand and mutual skills, while the IBL method concentrates on the development of logical and critical thinking plus creativity among students by scientific investigations. Many of the present investigations of teaching approaches focus on independently studying PjBL (Chung et al., 2020; Nurhadiyati et al., 2020) or IBL (Acar & Tuncdogan, 2018; Pedaste et al., 2015), which may leave a gap of not linking PjBL and IBL together.

Consequently, the current study adopts a literature review to consolidate the outcomes of previous studies, identify the causal relationship between the teaching methods and skills development, and design a model that explains the synergy of IBL and PjBL approaches. This approach combines practical strategies, which educators can easily get inspiration from, and it provides them with a design

framework that can be used in creating comprehensive educational programs that will help students develop key abilities.

Literature Review

Inquiry-Based Learning (IBL)

IBL is the process of discovering causal relationships, where learners formulate and test hypotheses through experimentation or observation, using methods similar to those of professional scientists (Pedaste et al., 2015). IBL is essentially student-centered, putting active problem-solving and knowledge construction at the center of instruction. It is theoretically based on constructivism or social constructivism, in which learning is thought of as something students actively construct, often with others and through others. In real-life practice, what IBL aims at is stimulating autonomous learning and deeper levels of understanding within an authentic, real-world problem. Effective enactment typically requires a well-articulated inquiry framework, meaningful student agency, productive group collaboration, and, importantly, timely teacher scaffolding combined with reflective forms of assessment. Dorier and García (2013) and Maaß and Artigue (2013) and Huang (2022) identifies that IBL should not be implemented in a uniform manner; on the contrary, differentiated instructional strategies have to be employed to accommodate learners with different levels of prior inquiry experience.

The IBL environments enhance the ability to work in teams and develop critical thinking through the need for students to communicate with one another, divide tasks, and later integrate as a team to solve a problem. This is also reflected in research literature. For instance, Huang (2022) established that once IBL was integrated into chemistry laboratory classes, the gaps between novice and experienced learners in their teamwork and capabilities related to solving problems became greatly reduced.

Similarly, in a quasi-experimental study by Pursitasari et al. (2020), the sample population totaled 56 seventh-grade students enrolled in Science Contextual Inquiry Learning. The results depicted significant increases in critical thinking. Therefore, the findings underline the contribution of inquiry learning to developing high-order cognitive and interpersonal competencies. For instance, there are quite a few models of inquiry learning developed, such as the Inquiry Cycle Theory

(De Jong, 2006; White & Frederiksen, 1998), Seven-Stage Inquiry Model, the 5E Learning Cycle Model (Bybee, 2006), the "Trinity" Inquiry Theory Model (Maeeots & Pedaste, 2014), the New Inquiry Framework (Pedaste & Mäeots, 2015), and POEE Unscaffolded Inquiry Model (Al Mamun, 2020), to name, but a few. Among them, Pedaste and Mäeots (2015) reconstructed the Inquiry Cycle proposed by De Jong (2006) and introduced a new Inquiry Framework, which includes five stages: Orientation, Conceptualization, Investigation, Conclusion, and Discussion. The scope of Conceptualization extends beyond hypothesis generation and adds a substage - Questioning. This stage of the Inquiry is exceptionally long and deep, because it involves more than just experiments but also includes data interpretation, etc. It is broader, not only an evaluation, but also involves discussions about the reflection, internal thought processes as well as the presentation of conclusions.

This framework entails a set of concepts and exemplifications for inquiry learning, which assists students in building knowledge and applying the principles of inquiry-based learning fully. Furthermore, the POEE (Prediction, Observation, Explanation, Evaluation) model, which is based on White and Gunstone's (1992) scaffolding theory, was restructured by Al Mamun (2020), giving emphasis to the following four stages: Prediction, Observation, Explanation, and Evaluation. In the Evaluation stage, the immediate feedback allows the student to self-monitor, appraise their own thinking, and locate the missed point at the same time. Besides that, scaffolding, the notion Engelmann is employed in his teaching method, is based on Vygotsky's (1987) Zone of Proximal Development (ZPD), which refers to the difference between tasks that a learner can perform independently, and those they can accomplish with the help of a more knowledgeable other (MKO). Learners' peers or teacher support can, in such instances, be of great help in lending them a hand to finish the task at hand. Thus, support systems based on the POEE model can assure students a scientific space for scientific thinking and processes.

By understanding existing models, inquiry learning predominantly fosters active student engagement and deep understanding through a phased, structured approach. These models typically include stages such as hypothesis and question formation, experimentation and data interpretation, assessment, and reflection. Moreover, they emphasize the role of support from more capable individuals (especially teachers) to help students reach cognitive levels they cannot achieve independently. Research done by de Jong et al. (2023) substantiates this theory

even more, and it recommends that teachers' guiding should be completely used to help students achieve real learning results during the IBL implementation.

Project-Based Learning (PBL)

Project-Based Learning (PjBL) is learner-centered, where students work on a real-world issue, learning by doing, and getting real work done with their acquired knowledge and skills during the framework of projects (Miller & Krajcik, 2019; Ngereja et al., 2020). The key to the effectiveness of PjBL is the combination of the several main components. At first, it should have contact links with a certain reality, so that students will understand the practical importance of the subjects and can get the motivation to study. Second, student initiative, or autonomy, is a must. Students should lend a hand in project planning, task assignment, and solution-solving. This not only inspires the spirit but also helps the cultivation of imagination. Also, cooperative learning by doing teamwork is one more means that can help the students develop communication skills as well as teamwork skills. But also the mental attitude and view toward the class must be created. This also involves continuous reflection and feedback. Students can also take advantage of quick feedback and reports, through which they can learn on the go and, thus, gradually improve the overall quality of the project. Additionally, progress and result orientation can be considered equally vital. Objectives of the instructional process and evaluation criteria should be unambiguously described in order for the student to learn what is expected of them (Garmendia et al., 2021; Grossman et al., 2019). The factors that form the solid basis of successful project-based learning are them together.

Recent research has investigated the effects of PjBL on students' teamwork skills and critical thinking. In general, it is believed that in PjBL, students learn to communicate effectively, manage conflicts, and coordinate tasks within groups to solve problems. Recently, in a study involving 359 students across two Spanish universities, the researchers investigated the relationship between student satisfaction and capabilities for teamwork in PBL. The findings showed a robust positive correlation between these variables (Melguizo-Garín et al., 2022). Similarly, in Project-Based Learning, PjBL, tasks require students to analyze information, communicate ideas, evaluate evidence, and synthesize knowledge to come up with tenable solutions, a process that greatly enhances critical thinking. Since critical thinking develops best through collaborative and dialogical processes, it is no

surprise that a study that involved 834 first-year engineering students who engaged in PjBL reported significant critical thinking development during the course of study (Cortázar et al., 2021).

There have also been several related reference models developed in furthering practice within the context of the implementation of PjBL. One key framework that has been used for guiding practice is the Project-Based 6E Learning Model, which consists of engagement, exploration, explanation, elaboration, extension, and evaluation phases. This gives a boost to the combination of basic elements of project-based learning with the principles taken from learning cycle theory. Considering the conventional sequence of PjBL tasks combined within a structured learning cycle, the 6E model allows for a logical and coherent educational route focused on learners' independence and creativity. This model calls for students to participate in active discovery and inventiveness, solve problems, and consider various ways of assessment during the evaluation stage.

On the other hand, teaching is not only concerned with knowledge and skills transfer and procedures but also instead it allows for values education, and this enhances the broader societal worth of an educator. It can also be used in different departments and teaching approaches (Şahin & Kiliç, 2023). Another study developed a PBL implementation model in engineering courses by allowing students to independently select topics, design problems and solutions, and emphasizing teamwork and teacher guidance. The student-centered model here allows learners to be at the center of the design process, such as having their own choice of the subject and the solution that they will try to address. It accentuates working together and interacting, which helps to improve integration and communication skills during the division of responsibilities, a need to cooperate, and give regular accounts of performance. With this new approach, the teacher is now the sponsor, offering the needful strategy and technical support but not being the direct problem solver. Moreover, the model is not just theoretical. It impacts on practice as well. It improves students' innovation skills and abilities to create projects that add to their educational background (Alfaro-Pozo & Bautista-Valhondo, 2019). Studies carried out on the PBL model so far stress student-centric learning, emphasize hands-on learning, motivation for teamwork, as well as apply theory to practice, which enhances concrete skills and innovation.

Teamwork Skills and Critical Thinking

Lacerenza et al. (2018) say that during teamwork, teams achieve common goals, and thus teamwork skills are the particular set of individual abilities the team members should possess. These skills include not only communication, but also conflict resolution, leadership, delegation of duties, and accepting feedback, among others. Schartel Dunn et al. (2021) also mention teamwork not as linear, but multifaceted as it manifests in one's speaking habits and thinking style besides the progress of project execution. Barker (2021), in this regard, revealed in his study on an undergraduate mineralogy class that PBL and feedback tools considerably enriched teamwork characteristics of the students.

In addition, critical thinking is a skill of a higher cognitive order that entails employing logic and evidence to scrutinize, assess, and rationalize body information to arrive at correct and sound findings for purposes of solving problems (Ghanizadeh et al., 2020). Kuhn (2019) adds that critical thinking goes beyond involving mind and process; it also incorporates dialogue. This is described as people conversing with one another using words, which leads to them passing back and forth ideas, rendering their views and hypotheses more-fined in the end. Moreover, critical thinking also includes meta-cognition, which in turn gives an individual an insight to oneself and guarantees that self-awareness is maintained (Nadurak, 2023). Being centered on competitions among development workers aimed at enhancing critical thinking, for instance, will tackle Kuhn's (2019) ideas directly. Tang et al. (2020) highlights that teamwork and communication are necessary in shaping critical thinking because through interaction with other students, it becomes more comprehensible to learners that the process of thinking is complex and that one has to be actively involved in order to develop cognitive skills. This is evidence that traditional independent learning environments are not suitable because, according to Kuhn (2019), an environment that fosters collaborative, discussion-focused learning is best if students' critical thinking is to improve.

Studying teamwork and critical thinking leads us to be conscious that both skills are formed as they primarily develop from a combination of interpersonal interaction and conversation during social events. This emphasizes the view that these abilities are generated and reinforced together through an effort to solve a particular problem collectively, joint discussions, and reflective interactions.

Methodology

Research Design

The present research draws on a literature review, focusing on the studies on project-based learning (PjBL) and inquiry-based learning (IBL) during the period of 2014-2024. The research examined the most influential and recent articles, which are found in the SCI and SSCI databases. This research, through a comprehensive analysis of principles, main factors, and models of PjBL and IBL, generates possible ideas and approaches to synchronizing the two teaching methods. Accordingly, this study focuses on the exploitation of opportunities of project-based learning and inquiry-based learning towards arriving at a balance between the practice-oriented nature of project-based learning and the thinking-oriented nature of inquiry-based learning. Although previous studies provide the main theoretical basis for the present study, the unique paradigm this study proposes is the teaching model that utilizes both methods with the purpose of fostering students' critical thinking and team-working skills together.

Search Strategy

To collect relevant literature, we used the Panda Academic Search engine to carry out a thorough search for the appropriate literature in the first place. This online academic search engine utilizes artificial intelligence and large data analysis to deliver speedy and overall customized search results across diverse disciplines, which include natural sciences, engineering, humanities, social sciences, medicine, and agriculture. The purpose of the search was to discover peer-reviewed empirical research articles published within the range of January 2014 to November 2024. The retrieval process included the following steps:

Defining Key Search Terms

The research decided to emphasize two main search words: PjBL (or Project-Based Learning Model) and IBL (or Inquiry-Based Learning Model). These search terms were quite purposeful, as their choice proved to be sufficient to reach the objectives of the current study.

Applying Search Filters

SciHub Addon applies as a browser extension, which aims to serve the

efficiency of academic research, refined with the feature of classification, which determines the quality of the journal. To be more precise, we employed it to cover only the studies that were published in journals which were both indexed in SCIE or SSCI and were ranked in the top quartiles of Q1 or Q2 in JCR. This last procedure scalds out research that is scientifically stringent and has an impact on the scientific community.

Initial Search Results

During the first search stage, I received almost 1,326 potential articles. Subsequently, the studies were filtered in a way that those most pertaining to the key terms were placed at the top of the list. This order of sorting not only enabled this review to put research with a lot of justification first but also highlighted work mostly connected to the research questions.

Research Selection

To further refine the search results and ensure the inclusion of studies meeting specific criteria, the following selection criteria were established:

Inclusion Criteria

Researchers were put on a priority list, and those requiring the implementation of virtual labs within inquiry-based learning environments came on top. Therefore, articles were collected and screened in the following way: only journals indexed in the "Science Citation Index (SCIE)" or "Social Sciences Citation Index (SSCI)" were chosen from the first and the second quartiles (Q1 and Q2) of "Journal Citation Reports (JCR)."

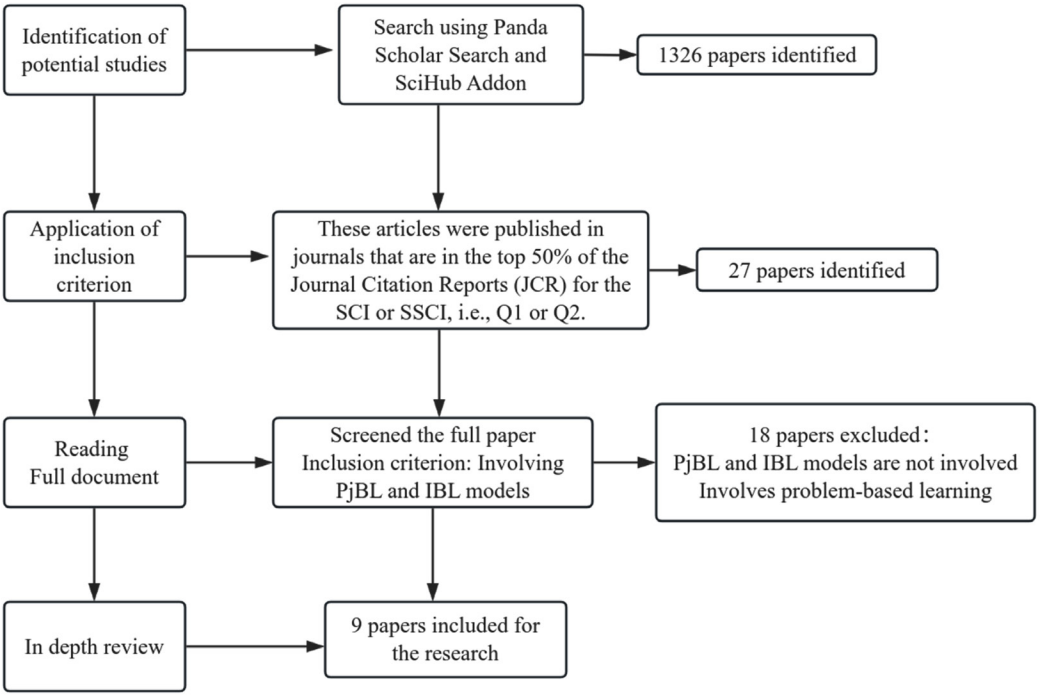
Exclusion Criteria

In order to maintain the focus of the research on the research objectives, articles that deal with problem-based learning were also not included. However, it is because project-based learning is mostly used in STEM courses that I also considered project-based learning in STEM education. Besides, studies published beyond the date limit were not included in the review so as to make it as up to date as possible. To maintain quality standards, articles published in journals outside the first and second quartiles of the Emerging Sources Citation Index (ESCI), Science Citation Index (SCI), or Social Sciences Citation Index (SSCI) were also excluded.

Figure 1 illustrates the literature selection process in this study, including the initial search, relevance sorting, application of quality standards, and final study selection.

Figure 1

Flowchart of the Literature Selection Process for the Research on PjBL and IBL (January 2014-November 2024)



Data Extraction and Analysis

The nine articles (two focused on project-based learning models and seven on inquiry-based learning models) were read and analyzed to summarize the key components of either the project-based learning model or the inquiry-based learning model.

Model Construction

The literature analysis, in this regard, leads to the design of a new instructional model that integrates PjBL and IBL, resulting from the learning principles of two types of approaches, such as the practice-oriented approach and thought-oriented

approach, which complement each other. The model is designed to ensure that it both stimulates students' practical engagement and promotes deep thinking.

Results

Literature Review Findings

Table 1 encapsulates both the main idea and outcomes of the investigation, which concentrates on the main components of the PBL and IBL approaches. The PBL model is known to develop students' problem-solving skill set because they need to design and consider themselves in different contexts for the project performance. Model key elements are problem elaboration, design and implementation of the solution, project assessment, and do not forget the need for interdisciplinary integration (i.e., STEAM) and reflective feedback mechanism (Chung et al., 2020; Saimon et al., 2023; Wang & Guo, 2021). Meanwhile, IBL focuses on enhancing students' ability for autonomous learning rather than teacher-centered instruction. It is themed integrally by questions, researching, data analysis, concluding, and finally, sharing (Acar & Tuncdogan, 2018; Pedaste et al., 2015). The IBL model also acts as a showcase for the supporting systems designs, such as distributed scaffolding (Hsu et al., 2015), and the use of educational technologies (for instance, digital tools and online modules) (Hong et al., 2017; Hong et al., 2019; Al Mamun et al., 2020). To conclude, PBL is process-centered, where learners do practical applications and have real assessment results, while IBL is centered on the inquiry process, and students create their own frame of reference and think from a new perspective. Developmentally, the two teaching methods do coexist and can be integrated into one another.

Table 1

Summary of Key Findings

No.	Article	SCIE/ SSCI	JCR	PjBL/IBL	Key Element
1	Chung et al. (2020)	SCIE/ SSCI	Q2	PjBL	Includes phases of problem definition, solution design, project implementation, and assessment of results, while focusing on the integration of Science, Technology, Engineering, Arts, and Math (STEAM) learning elements.
2	Saimon et al. (2023)	SSCI	Q1	PjBL	Involves students working collaboratively on projects in authentic situations, using reflection and feedback mechanisms to assess learning outcomes.
3	Pedaste et al. (2015)	SSCI	Q1	IBL	Defines a complete cycle of inquiry, including guided, exploratory, analytical, summarizing, and reflective phases.
4	Hsu et al. (2015)	SSCI	Q1	IBL	Includes collaborative scaffolding, cognitive scaffolding, and meta-cognitive scaffolding to provide different levels of support at different stages of learning.
5	Hong et al. (2017)	SSCI	Q1	IBL	Incorporating technology support, such as iPads, has enhanced the dynamic assessment of student interest and learning progress in inquiry-based learning.
6	Acar & Tuncdogan (2019)	SSCI	Q1	IBL	Includes problem situation setting, motivational stimulation, open-ended inquiry, and presentation of results.
7	Hong et al. (2019)	SCIE/ SSCI	Q1	IBL	Including activities such as predictions, experimental observations, test tasks, and interpretive feedback supports a seamless learning experience.
8	Al Mamun et al. (2020)	SCIE/ SSCI	Q1	IBL	Includes task guides, instant feedback and flexible module design to accommodate different learner needs.
9	Wang & Guo (2021)	SCIE/ SSCI	Q2	IBL	Includes setting up real problem situations, experimentation and data analysis, and evaluation and feedback on innovative solutions.

Instructional Model Based on PjBL and IBL

Project-based learning (PjBL) focuses on students and is framed around a batch of characteristics focusing on autonomy in real contexts, constructive inquiry, goal setting, teamwork, effective communication, and self-monitoring (Kokotsaki et al., 2016). Inquiry-based learning (IBL) is the process of knowing about the reasons behind certain things that happen, where students build theories and check them with their own experiments or observations, via methods that are similar to that of professional scientists who come up with conclusions by building their own concepts (Pedaste et al., 2015). The pedagogy that we have formulated in the framework of this study incorporates the teaching aspects of both the PjBL and IBL approaches to teaching. This model comprises five core elements: construction of real-world contexts, project-driven learning, collaborative in-depth inquiry, dynamic interaction and knowledge sharing, and multi-layered assessment with reflection at each stage. Table 2 details the exact courses and involvement levels.

Table 2

Process and Task Requirements

Instructional Process	Task Requirements
Authentic Context Construction	Teachers introduce real-life problems or contexts familiar to students in order to raise their interest and participation, leading them to understand the value of knowledge in real-life situations.
Project-Driven Learning	Educators design challenging project activities with roots in real-life issues to drive the learning process, encouraging students to achieve objectives by enhancing their problem-solving skills.
Collaborative in-Depth Inquiry	Teachers encourage a cooperative process wherein learners are grouped for investigative inquiry. In this process, task allocation, knowledge exchange, and joint decision-making work together in enhancing the dynamics of teamwork, deepening subject mastery, and sharpening critical analysis.
Dynamic Interaction and Knowledge Sharing	The students are going to be prompted to hold discussions, debate opinions, and then garner feedback from their peers and larger communities. Not only will this allow them to present the knowledge that they have gained but also to refine their interpretations and solutions by incorporating many different perspectives.
Multidimensional Assessment with Continuous Reflection	Guiding the evaluation process, instructors employ a multi-faceted approach that integrates assessments from teachers, peers, and self-reviews. Such a strategy assists learners in recognizing proficiencies and gaps, reinforcing learning through consolidation, and adjusting methods via introspection to support sustained academic progress.

In the authentic context construction, the educators must describe real-life situations or problems that are close to the students' social lives and experience and will hence raise their interests and involvement in the setting of activities. Relating meaningful life experiences with academic knowledge helps students appreciate how practical knowledge applies in everyday life and understand the necessity for such knowledge. This usually inspires them to become more active learners in other learning environments. For example, in a public speaking class, the instructor can bring in the problem of community environmental issues, such as water quality pollution monitoring and management, in order to broaden the horizon of the scientific facts usage in the solution of real-life problems surrounding the students.

Project Driven Learning

The instructor builds project assignments whose themes involve the issues usually encountered in the outside world, such as complex and challenging problems. These projects are a leading driver of learning, promoting continued problem-solving practice because students are motivated by being actively involved in seeking successful completion of their projects. Example: an instructor of an engineering class might give the students a project entitled "Design and Build a Small Bridge." Such an approach will engage the student in merging knowledge across multi-disciplines such as mathematics, physics, and the science of materials in order to bring the project to reality. Through such hands-on tasks, learners not only achieve project goals but also internalize core subject-matter concepts in a practical, experiential manner.

Collaborative In-Depth Inquiry

Teachers organize pupils into groups to undertake inquiry-based learning activities. In each group, the pupils are fully engaged in the research process with clear task distribution, with each sharing ideas and balancing decisions together. Thereby, this process not only trains students to work in a team but also to understand the subject more, which gets best results when critical thinking is coming. For instance, historians may form a working group in the course of the projects, where each member has a specific responsibility for acquiring sources from a certain time period, for interpreting the sources, and for debating causal links between events. In the process, they are stimulated by the flow of information and ideas, and therefore, they acquire facilities to reveal deeper components of historical issues.

Dynamic Interaction and Knowledge Sharing

The teacher acts both as a facilitator and a participator. The teacher motivates students to be involved in intensive communication and debates among students of the same group and across groups and receive feedback from all participants. It aims to allow students to present learning outcomes and, at the same time, guide them in adopting a new perspective on reviewing teaching practices and solutions. This would broaden their horizons cognitively, ensuring both depth and breadth in knowledge acquisition. In the courses, the pupils state their private perception of some issue, and having this as a basis, it helps them to find out more about this topic through the thoughts exchange and debates among the classmates.

Multidimensional Assessment with Continuous Reflection

The instructor guides students to utilize a multidimensional assessment model, including teacher assessment, peer assessment, and self-assessment. Such a multi-dimensional assessment tool will enable learners to identify clearly their strengths and development points in the process of learning. In the meantime, it allows structuring of knowledge acquired and enhances further refinement of learning strategies by way of regular reflection, thus guaranteeing continuous academic development. For instance, at the end of a project, students first engage in self-assessment regarding their contributions and what they might do differently. Later, they undergo a peer review that focuses on collaborative behavior and problem-solving effectiveness, while instructors provide feedback with regard to the outcome of the project and the level of participation. Through critical analysis of such layered assessments, learners fold insights into subsequent work tasks in order to iteratively refine their approaches and build on the progressive trajectory of development.

Discussion

This study investigates an integrated framework of PjBL and IBL, especially how this approach contributes to the development of teamwork competencies and enhances critical thinking skills among students. Based on an extensive literature review and model formulation, the subsequent analysis will discuss implications of the findings, draw parallels with established research, evaluate the practical effectiveness of the model, address limitations of the study, and indicate avenues for further research.

Theoretically, this research underlines the potential of integrating different teaching approaches, confirming previous studies that the integrated application of teaching approaches can improve learning outcomes significantly-a fact corroborated by Sanchez-Gomez (2022) and Connolly et al. (2023). The current study will integrate an idea of a hands-on project-based approach, PjBL, and thinking-oriented way of instruction, IBL, forming broader theoretical grounds for innovations in education in order for students to be provided with knowledge and skills that mean the most: teamwork and critical thinking.

While the model helps instructors with a better framework to organize a curriculum that addresses the current educational problems, students get more chances and skills to be well-prepared for their future careers and life in the societies.

This study takes a novel approach by focusing on integrated learning (e.g., PBL and IBL together) rather than on either PBL (Chung et al. 2020; Nurhadiyati et al., 2020) or IBL (Acar & Tuncdogan, 2018; Pedaste et al., 2015) separately, as previous studies do. Previous studies mainly explore the implementation of PBL to the extent that it is in a specific subject where it is used or its process of project, especially regarding the soft skill access of teamwork. The research on IBL particularly assesses the impact on students' independent learning and their cognitive performance. Here, on the other hand, blending the strengths of both, I will build a more holistic instructional model that aims at simultaneously developing students' leadership and critical thinking.

This present study develops an instructional framework incorporating five core elements: Authentic Context Construction, Project-Driven Learning, Collaborative In-Depth Inquiry, Dynamic Interaction and Knowledge Sharing, and Multidimensional Evaluation with Reflective Enhancement. These components are combined synergistically to form a learning environment that will foster teamwork among students while simultaneously engaging students in developing critical thinking. The process first involves establishing an authentic learning context whereby the students will be able to realize the utilitarian value of knowledge; thus, this lays a very meaningful foundation for further learning. Then, project-driven tasks provide a motivating structure through which learners advance problem-solving abilities and goal-oriented learning behaviors.

In collaborative inquiry, students acquire skills in teamwork and analysis by sharing the workload, exchanging knowledge, and making collective decisions. This is further enhanced through interactive dialogue that gives feedback, enabling participants to broaden their perspectives and deepen conceptual understandings. Such integration of multidimensional assessment and continuous reflection allows students to identify personal strengths and weaknesses, refine learning strategies, and attain sustained academic growth.

According to the existing literature, these competencies are developed separately by both PjBL and IBL (Huang, 2022; Melguizo-Garín et al., 2022). In contrast, an integrated model tries to enhance their positive impact on learning by exploiting complementary strengths of both methods.

This study is not without its limitations. Reliance on the literature review methodology, while useful in synthesizing previous findings, does not allow for empirical validation regarding the effectiveness of the proposed model in real life. Future research in this regard could make use of controlled experimental designs which would test the effectiveness of the model across educational settings and diverse student populations. Further, even as an attempt has been made to focus only on high-quality sources in the literature search, some relevant studies may not have been caught, indicating thereby potential gaps in analysis. For future reviews, wider search strategies should be contemplated to capture a broader range of publications.

In light of the constraints, a few research areas seem most valuable. First, in many disciplines and educational levels, empirical studies can be implemented according to the framework proposed herein and collect data related to learning outcomes, combined with students' perceptions, to determine how this model contributes to collaborative and critical thinking. Such evidence will strengthen the theoretical and practical justification for this model. Second, ways should be researched in which the framework can be embedded based on differences in learners, such as learning preferences or prior knowledge, aiming at personalization and improvement in overall effectiveness. Lastly, an investigation is required to see how and when emerging technologies, artificial intelligence, and virtual realities could open new opportunities for much more immersive and responsive learning environments within the model.

Conclusion and Recommendations

This paper effectively integrates PjBL and IBL into a comprehensive, novel instructional framework for enhancing students' collaborative teamwork skills while fostering critical thinking. Using a systematic literature review approach, we unearthed the core elements of both approaches, resulting in an integrated model: authentic context construction, project-driven tasks, collaborative in-depth inquiry, dynamic interaction and knowledge sharing, and multidimensional assessment coupled with continuous reflection. At a more theoretical level, such integration represents a step forward in discussing the integration of pedagogical approaches, while at the practical level; it provides educators with a structured yet adaptive tool.

However, the research has its limitation in that it relies solely on the synthesis of literature, which is not validated through empirical testing. For future work, emphasis should be put on conducting empirical tests in different scenarios, optimizing the retrieval method for literature, considering individual differences, embedding new technologies, and exploring cross-cultural implementations. These will enable ongoing improvement of the model and facilitate wider development in improving educational quality.

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