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Exploring Instructional Pathways for College Physical Education from the Perspective of Project-Based Learning

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Abstract: Against the backdrop of deepening reforms in higher education physical education and the comprehensive promotion of the "Five-Domain Education" initiative in the new era, traditional physical education models face several challenges, including fragmented content, insufficient student agency, and limited development of practical application abilities. Project-Based Learning (PBL), characterized by task-driven processes, collaborative teamwork, and outcome-oriented design, offers a novel approach to reconstructing the pedagogical paradigm of college physical education and enhancing its educational effectiveness. It has thus become a key pathway for transforming physical education from a focus on skill acquisition to the cultivation of comprehensive competencies. This study elucidates the core value of college physical education from a PBL perspective in two key dimensions: enhancing students' engagement in physical activity and fostering teamwork capabilities. It further analyzes two major influencing factors—teacher competency and resource support—and proposes corresponding implementation pathways. By employing authentic, context-based tasks as driving forces, PBL facilitates a shift in physical education from skill training toward competency development, thereby providing an operational framework for the high-quality development of college physical education.

Keywords: project-based learning, college physical education, instructional value, influencing factors, implementation pathways

1. Introduction

For a long time, college physical education has been confronted with persistent challenges, including low levels of student participation, weak motivation for physical exercise, and a disconnect between in-class and extracurricular activities. In this context, Project-Based Learning (PBL), which is grounded in the completion of authentic tasks and emphasizes students' autonomous construction of knowledge through the process of solving complex problems, offers a promising avenue for reform in college physical education.

Building upon an analysis of its educational value, this study systematically examines the key factors influencing the implementation of PBL and proposes a comprehensive set of implementation pathways, ranging from instructional design to assessment. The aim is to facilitate the transformation of college physical education from a focus on "teaching techniques" to the cultivation of holistic competencies.

2. The Value of College Physical Education from a Project-Based Learning Perspective

Traditional physical education (PE) classes have long relied on a combination of teacher demonstration and student imitation, in which students passively receive instruction. Their participation is often manifested more in physical presence than in psychological engagement. In contrast, Project-Based Learning (PBL) facilitates a transformation of students' roles — from passive practitioners to active inquirers — by designing challenging and authentic sport-related tasks (Wang et al., 2024).

Driven by project tasks, students are required to independently plan training schemes, collaborate through division of labor, and jointly address practical problems encountered during the process. This shift in subjectivity is central to stimulating students' intrinsic motivation for participation. PBL tasks typically extend over several weeks, requiring students to complete phased outcomes at multiple milestones. Such continuity effectively avoids the

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"end-of-class disengagement" commonly observed in traditional teaching.

Moreover, PBL emphasizes the presentation of outcomes, thereby enhancing the social visibility of students' participation. Attention and feedback from peers and instructors form a positive motivational loop. What students gain from PBL is not merely a course grade, but a recognized and internalized value experience, which further translates into sustained motivation for engaging in physical activity. Compared with compulsory check-ins or physical fitness tests, PBL activates students' willingness for autonomous participation, which serves as a fundamental prerequisite for the formation of exercise habits. The shift from classroom attendance rates to time spent on self-directed extracurricular exercise, as well as the effectiveness of PBL in promoting physical engagement, has been validated in many universities.

3. Influencing Factors of College Physical Education from a Project-Based Learning Perspective

3.1 Teachers' project design and instructional competence

Teachers' ability to design and guide projects constitutes the primary determinant of whether PBL can be effectively implemented. Traditional PE teachers are accustomed to instructional models centered on demonstration, explanation, and corrective feedback. However, PBL requires a transition in teachers' roles—from "action instructors" to "project designers and learning facilitators." This shift imposes new competency requirements on teachers (Zhu, 2024).

During the project design phase, teachers must determine which motor skills and physical fitness objectives are suitable for a project-based approach. They are also required to design project themes that are authentic, challenging, and feasible, anticipate potential difficulties, and develop corresponding support strategies. For instance, in a basketball course, traditional assessments might include dribbling layups or set-position shooting. In contrast, a PBL-oriented design might involve organizing a "3-on-3 class basketball tournament," where students independently formulate competition rules, design training plans, and assign roles such as referees and record keepers. This requires teachers to possess a comprehensive understanding not only of technical aspects of basketball but also of event organization and management.

During the implementation phase, the teacher's role shifts from correcting movements to providing scaffolding support (Cao & Chen, 2024).

3.2 Provision of facilities, equipment, and instructional time

The availability of facilities, equipment, and instructional time constitutes a fundamental constraint on the implementation of PBL in college PE. PBL emphasizes authentic contexts and task-driven learning, which differs significantly from traditional teaching in terms of resource requirements. Conventional PE instruction typically focuses on segmented skill training, requiring relatively simple and function-specific equipment, such as basketballs, cones, or skipping ropes.

In contrast, PBL requires students to independently design training content and modes based on their project themes, resulting in diversified and uncertain equipment needs. For example, a group organizing a class volleyball league may require scoreboards, loudspeakers, numbered jerseys, and video recording devices — items that are often insufficiently available in standard sports equipment rooms.

In terms of space, PBL requires not only regular training venues but also areas for group discussion, spaces for outcome presentation, and environments for simulated competitions. The exclusive use of limited facilities also poses practical challenges. Given the already constrained availability of sports facilities in many universities, it becomes difficult to coordinate simultaneous needs for competitions and space allocation across multiple project groups.

Ensuring adequate instructional time is equally critical. PBL emphasizes the integrity of the problem-solving process, including topic selection, plan design, skill training, and outcome presentation, all of which require relatively concentrated scheduling. The traditional model of one PE session per week (typically 90 minutes) is insufficient to support PBL, often resulting in fragmented tasks and difficulties in maintaining progress.

4. Implementation Pathways for College Physical Education from a Project-Based Learning Perspective

4.1 Designing project themes based on authentic sport contexts

Designing project themes grounded in authentic sport contexts serves as the starting point of PBL. The core lies in embedding instructional objectives into meaningful and challenging tasks. A

well-designed project theme should meet several criteria, among which authenticity is paramount — referring to a high degree of relevance between the project context and real problems that may arise in students' actual sport participation. For example, rather than abstractly requiring students to practice volleyball passing skills, instructors may assign a task such as "representing the class in an inter-departmental volleyball competition," thereby motivating students to actively train various skills under the drive of a real competitive context (Sun et al., 2025).

Taking a basketball teaching unit as an example, instructors may design a project titled "Class 3-on-3 Basketball League," requiring students to form teams, develop training plans, conduct tactical rehearsals, assign referees, record game data, and create promotional materials. This project integrates multiple skill objectives—such as dribbling, passing, shooting, defense, and tactical coordination—while also incorporating interdisciplinary competencies including event organization, teamwork, and public communication.

When introducing the project, teachers should utilize videos, images, or previous cases to help students construct a concrete understanding of the task, while clearly specifying the expected outcomes and evaluation criteria. By situating learning within authentic sport contexts, PBL transforms decontextualized skill training into meaningful activity, enabling students to internalize and transfer skills through project completion.

4.2 Establishing heterogeneous cooperative learning groups

Forming heterogeneous cooperative learning groups provides an organizational foundation for the smooth implementation of PBL. Heterogeneity refers to differences among group members in terms of skill levels, physical fitness, personality traits, and gender, rather than grouping students solely based on ability (Yuan et al., 2025).

This grouping strategy is grounded in Vygotsky's Zone of Proximal Development theory, where learners at different levels can mutually support and promote each other through collaboration. More capable students deepen their understanding by guiding others, while less experienced students gain support through observation and imitation.

In practice, teachers should follow the principle of "intra-group heterogeneity and inter-group homogeneity." Diversity within groups ensures complementary strengths — such as technically proficient "skill leaders," organizationally capable "team captains," detail-oriented "recorders," and communicative "presenters." Meanwhile, similarity across groups ensures balanced overall competence, preventing large disparities that may undermine motivation in competitive tasks. A group size of 4–6 students is generally appropriate; smaller groups may overburden individuals, while larger groups risk free-riding (Bai & Ren, 2025).

Teachers may use preliminary assessments and classroom observations to understand students' skill levels and collaboration tendencies before grouping. For novice PBL classes, a guided grouping approach may be adopted, where teachers define group structures and roles while allowing students to negotiate assignments. For more experienced classes, a contract-based grouping approach can be used, allowing students to select teammates and establish collaboration agreements outlining responsibilities and accountability. Teachers should closely monitor early group functioning and intervene when serious conflicts or inequities arise.

4.3 Establishing phased tasks and assessment rubrics

Developing phased tasks and assessment rubrics is essential for ensuring the quality of the PBL process and providing timely feedback. Given the extended duration of PBL, evaluating only final outcomes may lead to a lack of direction and motivation during the process, resulting in uneven effort or task abandonment.

Phased tasks involve decomposing a comprehensive project into multiple logically sequenced sub-tasks, each with clear output requirements and deadlines (Hu et al., 2025). For example, the "Class 3-on-3 Basketball League" project can be divided into four stages:

Stage 1: Team formation and role assignment; deliverables include team rosters and role descriptions (Week 1).

Stage 2: Development of training plans and baseline skill assessment; deliverables include detailed training schedules (e.g., three sessions per week, 60 minutes each) (Week 2).

Stage 3: Simulation matches and tactical adjustments; deliverables include video clips and tactical analysis reports (Weeks 3–4).

Stage 4: Official competition and event documentation; deliverables include match results and summary reports (Week 5).

At each stage, clear assessment criteria (rubrics)

should be established to define performance standards. Rubrics typically include three components: (a) evaluation dimensions (e.g., technical proficiency, teamwork, depth of reflection), (b) performance level descriptors (e.g., excellent, good, satisfactory, needs improvement), and (c) weighting of dimensions based on instructional priorities.

The development of phased tasks and rubrics should ideally follow a co-construction approach, where teachers provide initial drafts and student representatives participate in discussion and revision, thereby enhancing student ownership and engagement.

4.4 Integrating interdisciplinary knowledge and skills

The integration of interdisciplinary knowledge and skills is a defining feature of PBL that distinguishes it from traditional PE instruction. It plays a critical role in deepening project learning and enhancing its educational value. PBL in physical education should not be confined to motor skills but should serve as a platform for the comprehensive application of multi-disciplinary knowledge (Yang, 2025).

In the "Class 3-on-3 Basketball League" project, teachers can guide students to integrate knowledge from various disciplines:

Mathematics: statistical recording and analysis of game data (e.g., scoring, rebounds, assists), calculation of shooting percentages and efficiency metrics, and visualization through charts.

Language Arts: writing event reports, promotional materials, and reflective summaries using clear and engaging language.

Art/Design: designing team logos, creating event posters, and organizing visual displays.

Information Technology: recording match videos, editing highlight clips, and managing data using digital tools.

Interdisciplinary integration is not merely the addition of external content into PE, but rather the use of disciplinary knowledge to support the realization of project goals. This requires teachers to intentionally design tasks that naturally invoke cross-disciplinary knowledge and to facilitate brainstorming processes that encourage students to identify integration opportunities independently.

Teachers may also invite instructors from other disciplines to participate in project guidance — for example, art teachers for logo design or language teachers for reviewing written reports. Such integration enriches the learning content of PE, enhances students' physical competence and comprehensive literacy, and demonstrates the practical value of knowledge transfer in authentic contexts.

4.5 Organizing outcome presentation and reflective debriefing

Organizing outcome presentation and reflective debriefing is a critical stage for meaning-making and experiential consolidation in PBL. While PBL emphasizes final outputs, the value of these outputs lies not only in their presentation but also in the reflective processes that help students recognize their developmental trajectories and extract transferable insights.

Outcome presentation should be diverse and extend beyond competition results. In the "Class 3-on-3 Basketball League" project, teachers may organize a "Project Expo," where each group presents multiple outputs, including:

Team culture boards (team name origin, logo design concepts, slogans, member profiles);

Training logbooks documenting plan implementation and reflective entries;

Data analysis reports showing statistical trends and individual progress;

Highlight videos capturing key moments and team narratives.

Presentations may involve audiences such as students from other classes, instructors, and even parents, thereby enhancing impact and ceremonial significance.

Reflective debriefing, conducted after presentations, requires a structured framework to guide students' multi-dimensional reflection. Key reflective questions may include: strengths and areas for improvement, individual roles and competency development, major challenges and strategies for overcoming them, alternative approaches for future projects, and transferable experiences for learning and life.

Reflection can be conducted through individual journals, group discussions, and whole-class sharing, forming a multi-layered reflective network. In this process, the teacher's role is to synthesize and generalize students' insights into structured knowledge, transforming fragmented experiences into enduring cognitive frameworks.

5. Conclusion

From a PBL perspective, college physical education centers on promoting student participation

in physical activity and cultivating teamwork competencies as its core values, while being constrained by factors such as teachers' design and facilitation capabilities, as well as facility and time resources. The proposed implementation pathways form a closed-loop system encompassing theme design and evaluation feedback, thereby enabling the transformation of physical education from skill training to competency development.

Fundamentally, PBL seeks to restore physical education to meaningful life practice, fostering students' enthusiasm for exercise, enhancing their collaborative abilities, and cultivating their thinking skills through the completion of authentic tasks. Future research should further explore differentiated implementation strategies across various types of universities, promoting the normalization of PBL in college physical education.

Conflict of Interest

The author declares that he has no conflicts of interest in this work.

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