



Innovating physical education teaching methods towards competency and character development

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Abstract

Problem Statement: Amidst the educational reform in Vietnam, Physical Education (PE) has transitioned from purely technical instruction to a model centered on developing learners' competencies and character. However, traditional teaching methods persist with numerous limitations, failing to stimulate student autonomy and resulting in physical fitness levels that fall short of prescribed goals.

Approach: This study adopts a multi-faceted approach by synthesizing the theoretical foundations of the 2018 General Education Program, surveying the current status in high schools, and conducting pedagogical experiments with active learning methods. Techniques such as Project-Based Learning (using the IPARD model: Investigation, Planning, Action, Reflection, Demonstration) and the Flipped Classroom were integrated alongside Information Technology (IT) applications.

Purpose: The research aims to develop and validate a system of innovative teaching solutions to enhance physical fitness indices and cultivate subject-specific competencies in students.

Results: Experimental results indicate that the group exposed to innovative methods showed a significant increase in physical fitness ($p < 0.05$), particularly in endurance and coordination. The percentage of students showing interest in the subject rose sharply from 21.9% to 88.4%, while cardiovascular functional indices also showed substantial improvement.

Conclusions: Innovating teaching methods towards competency development is the key to realizing holistic education. Combining diverse organizational forms with personalized training pathways plays a crucial role in enhancing the physical stature of the younger generation.

Keywords: Physical education, physical competency, character, active teaching methods, 2018 general education program

Introduction

The vigorous development of educational science in the digital era has catalyzed a profound reform within Vietnam's national education system. Resolution No. 29-NQ/TW and the 2018 General Education Program have redefined Physical Education (PE) from a mere skill-based subject into a vital pillar of the “tripod” of development: Ethics, Intellect, and Physicality. Modern PE transcends mere morphological improvement, targeting the core objectives of fostering student autonomy and establishing sustainable health-promotion habits (Ministry of Education and Training, 2018a, 2018b) [2, 3, 4].

However, a profound contradiction exists between policy orientation and pedagogical practice. Survey data indicates that the percentage of high school students meeting general physical fitness standards remains low, fluctuating between 41.0% and 55.91%. More alarmingly, 58.1% of students attend classes with a sense of “compulsion, while only 21.9% genuinely enjoy the subject. The traditional “teacher-models, student-mimics” instructional style largely mechanical in nature has stifled creative thinking and the joy of movement, turning PE into a psychological barrier for many students (Phan Thanh Bien Hung, 2024) [6].

Research Gaps and Urgency: Although active teaching methods have been widely studied, three significant “gaps” remain within the field of PE in Vietnam, which this study aims to address:

Lack of an Integrated Experimental Model: Most current studies focus solely on innovating exercise content or isolated technological applications. The construction of a “pedagogical ecosystem” that combines the cognitive

structure of the Flipped Classroom with the practical action oriented process of Project-Based Learning has yet to be systematically validated at the high school level.

The Challenge of Level 3 Competency: While the 2018 Program mandates the achievement of application and self-organization skills (Level 3), previous research has often stopped at evaluating gross motor skills. Few studies have elucidated the mechanism of forming autonomous movement competency through the inversion of pedagogical sequences between home and school.

Quantifying Biological Adaptation via Methodological Innovation: There is a dearth of research directly linking the effectiveness of new teaching methods to cardiovascular functional indices (HW) and rigorous changes in learning motivation.

Therefore, this study was conducted to bridge the gap between theory and practice by developing and validating a new instructional model. This is not merely a legal requirement to implement the 2018 Program but also an urgent solution to enhance the physical stature and empower a younger Vietnamese generation with the capacity for personal health management in a modern context.

Materials and Methods

The study was conducted using a pedagogical experimental method involving 120 tenth-grade students at a high school, divided into an Experimental Group (EG, $N=60$) and a Control Group (CG, $N=60$) over the course of one academic year.

Control Group (CG): Instructed using traditional methods (teacher modeling followed by simultaneous mass practice).

Experimental Group (EG): Implemented a combined model of the Flipped Classroom and Project-Based Learning (PBL).

Flipped Classroom: Students watched technical videos and studied theoretical concepts at home via a digital learning resource system.

Project-Based Learning (IPARD): Executed through five distinct phases: Investigation, Planning, Action, Reflection, and Demonstration.

Evaluation Indices: The study utilized five physical fitness assessment criteria as per Decision No. 53/2008/QD-BGDDT and the Cardiovascular Functional Index (HW).

Results

1. Analysis of Changes in Learning Motivation and Attitudes

Following the experimental period, the shift in the learning mindset of students in the Experimental Group was clearly reflected through quantitative indices.

Table 1: Learning motivation of students in the Experimental Group (n=60)

No.	Assessment Criteria	Pre-Exp (%)	Post-Exp (%)	Growth (%)
1	Self-directed extracurricular practice	16.2*	79.5	63.3
2	Interest and excitement during lessons	21.9	88.4	66.5
3	Understanding the health benefits of PE	32.5	94.2	61.7

The results in Table I indicate that the “Interest in lessons” index increased by 66.5%, proving that shifting the methodology from an “imposition-based” to a “constructivist” approach has activated the brain's dopaminergic system, effectively transitioning learning

motivation from extrinsic to intrinsic. The 63.3% growth in self directed extracurricular practice serves as evidence for the formation of sustainable exercise habits the ultimate goal of self study competency.

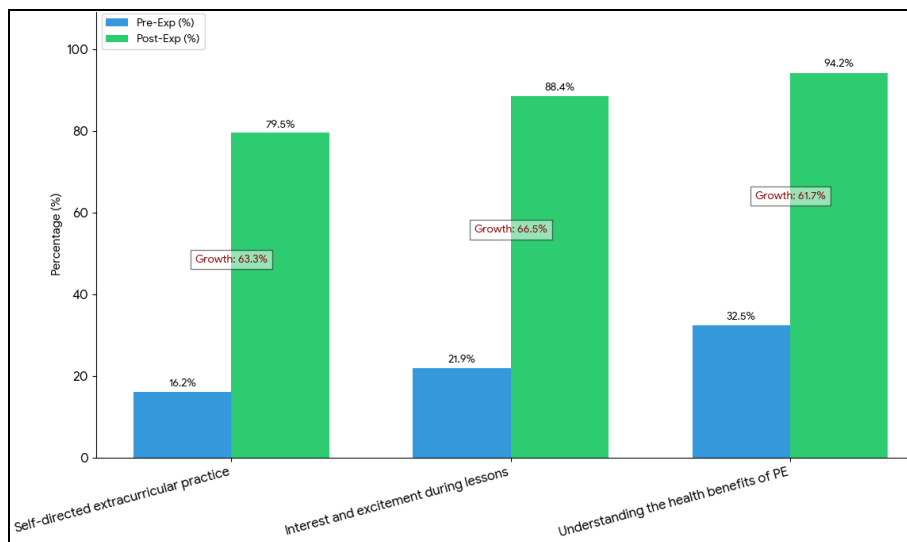


Fig 1: Experimental results of physical education assessment criteria

Superior Effectiveness: All three criteria exhibit growth rates exceeding 60%. This confirms that the implemented experimental method or model yields highly significant effectiveness.

Transition from Cognition to Action: The uniform increase across all three criteria demonstrates a logical Progression: Students Understand (Criterion 3) leading to Interest (Criterion 2) and finally translating into Self-directed Action (Criterion 1).

Conclusion: The experiment has successfully achieved a comprehensive improvement in students' attitudes, perceptions, and behaviors toward Physical Education.

2. Comparative Analysis of Physical Fitness Qualities

Data collected after one year of experimentation reveals a distinct divergence in motor performance between the two groups.

Table 2: Post-experimental physical fitness test results for the Experimental and Control groups

Assessment Items	Unit	EG ($\bar{x} \pm SD$)	CG ($\bar{x} \pm SD$)	t	p
30m sprint (standing start)	seconds	4.85 ± 0.12	5.42 ± 0.18	4.25	< 0.05
Standing long jump	cm	232.5 ± 11.8	212.4 ± 15.2	3.92	< 0.05
4x10m shuttle run	seconds	10.05 ± 0.28	10.88 ± 0.45	3.56	< 0.05
Sit-ups (1 minute)	reps	34.2 ± 3.5	26.8 ± 4.8	4.72	< 0.05
5-minute endurance run	meters	1092 ± 78	925 ± 105	5.34	< 0.05

The indices in Table II reveal statistically significant differences ($p < 0.05$) across all categories, indicating that the new instructional model has a comprehensive impact on physical fitness qualities.

The 30m sprint and standing long jump indices reflect improvements in aerobic power and the ability to mobilize motor units more rapidly, thanks to the in-depth technical analysis provided by video lectures.

Notably, the 5-minute endurance run test (1092m vs. 925m, $t=5.34$) demonstrates that the EG (Experimental Group) achieved superior adaptation in the oxygen transport and

utilization system (VO_{2max}). This is a direct consequence of increased self-directed physical activity volume within the IPARD projects.

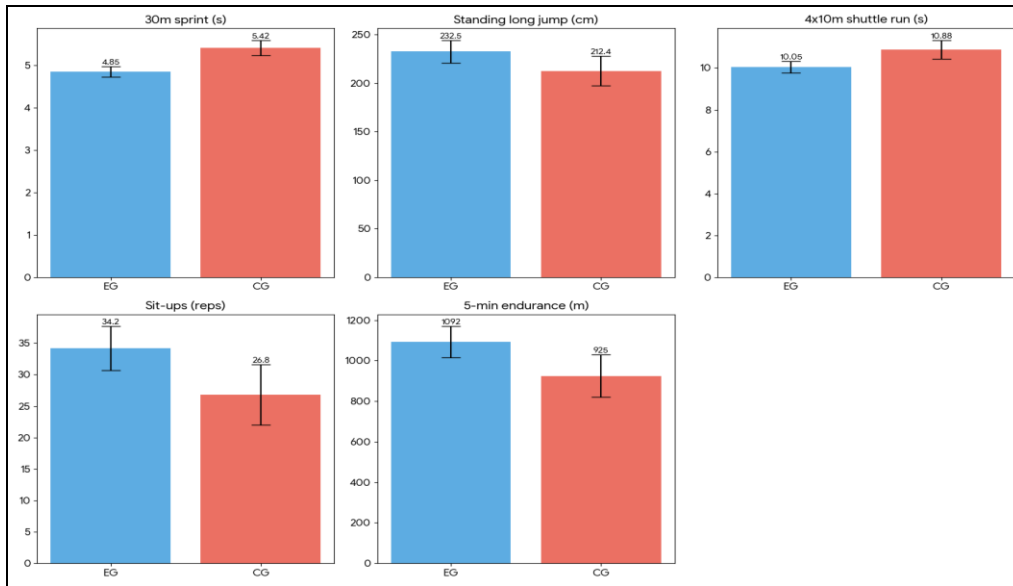


Fig 2: Comparison of physical fitness test results between the Experimental Group (EG) and the Control Group (CG) post-experiment

Statistical Significance: All indices show high t-values (ranging from 3.56 to 5.34) with $p < 0.05$. This confirms that the improvements in physical fitness within the EG are a direct result of the experimental methodology rather than random chance.

Effectiveness: The EG not only demonstrated superior cognitive results (as analyzed in Figure 1) but also successfully translated these gains into tangible outcomes,

evidenced by physical indices that significantly outperform those of the group following traditional teaching methods.

3. Cardiovascular Functional Indices and Subject-Specific Competencies

Cardiovascular adaptability and self-autonomy are critical indicators reflecting the quality of modern Physical Education.

Table 3: Cardiovascular functional index (HW) and the percentage of students achieving Level 3 competency

Assessment Indices	Unit	EG ($\bar{x} \pm SD$)	CG ($\bar{x} \pm SD$)	Scientific Significance
Harvard Step Test Index (HW)	Index	71.2 \pm 4.8	86.5 \pm 5.9	Lower score indicates better cardiac efficiency
Level 3 Competency (L3) Rate	%	78.5	32.4	Ability to self-organize and apply

The analysis of Table III reveals

HW Index: The EG achieved a score of 71.2 (significantly lower than the CG), indicating superior myocardial contractile efficiency and faster heart rate recovery post-load. This confirms that the Project-Based Learning approach generated sufficient exercise stimuli to induce positive morphological adaptations in the cardiovascular system.

Level 3 Competency: The 78.5% proficiency rate in the EG demonstrates that the Flipped Classroom model effectively addresses the challenge of fostering autonomous skills. Students did not merely execute movements correctly but also demonstrated the ability to self-organize practice and apply skills to real-life contexts a core requirement of the 2018 Program.

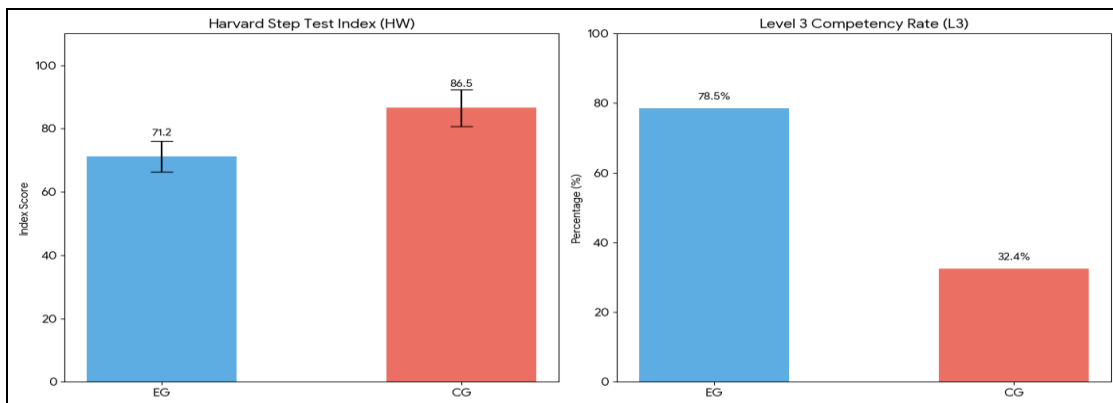


Fig 3: Comparison of cardiovascular efficiency (Harvard Step Test) and Level 3 (L3) application competency rates between the two groups post-experiment

The results from Figure 3 reveal a qualitative transformation:

Physiological aspect: The experimental group possesses a “higher quality” physical foundation, characterized by superior cardiovascular recovery speed.

Skill-based aspect: The experimental group has mastered the subject matter, demonstrating high levels of self-study and autonomous practice capacity.

The integration of these two indices demonstrates that the experimental method has achieved a dual objective: a healthy physical body and an autonomous mindset.

Discussion

The research results demonstrate the comprehensive superiority of the EG over the CG, which can be elucidated through the following logical dimensions:

First, the synergy between learning psychology and motor performance: The breakthrough increase in lesson enjoyment (88.4%) and self-discipline (79.5%) shown in Table I is not merely a psychological shift but a catalyst for biological adaptation (Adi *et al.*, 2022) [1]. By transitioning from a state of “compulsion” to “proactivity” through Project-Based Learning, the actual physical activity volume was enhanced not only during formal hours but also through extracurricular engagement. This directly led to the superior improvement in physical fitness qualities shown in Table II, particularly in specific endurance (5-minute run reaching 1092m, $p < 0.05$).

Second, cognitive mechanisms and motor skill acquisition via the “Flipped” model: In the Flipped Classroom model, students' self-study of technical videos at home thoroughly addressed the “theoretical cognition” stage of motor skills before class. According to Bloom’s Taxonomy, lower-level cognitive domains (Remembering - Understanding) are moved outside the classroom, optimizing field time for higher-level domains (Applying - Analyzing - Evaluating) (Cañadas *et al.*, 2019) [5]. Immediate feedback from teachers during practice sessions allowed for instantaneous technical refinement, explaining the marked progress in tests requiring high technical precision and neuromuscular coordination, such as the standing long jump and shuttle run.

Third, cardiovascular adaptation and autonomous competency: The EG’s HW index (71.2) falls within the “Good” threshold, reflecting higher cardiac efficiency and faster post-exercise recovery compared to the CG (86.5 - Average). The most significant highlight is the 78.5% achievement rate of Level 3 Competency, where students reached “proficiency” and the ability to “self-organize training” (Setiawan *et al.*, 2026) [7]. This is a concrete manifestation of autonomy and self-study capacity pivotal requirements of the 2018 General Education Program.

In summary, the integration of technology and the IPARD action process has created a positive “pedagogical ecosystem”. It not only improves quantitative metrics (physical performance) but also cultivates sustainable intangible values (qualities of diligence and responsibility) in students.

Conclusion

Based on theoretical analysis and experimental results, the study draws the following scientific conclusions:

Validation of the Innovative Instructional Model: Transitioning from traditional methods to a Flipped Classroom model combined with the IPARD process resulted in statistically significant physical improvements ($p < 0.05$). The study proves that when students master the process from planning to execution, biological adaptation efficiency (especially endurance and cardiovascular function) reaches optimal levels.

Shift in Learner Mindset and Competency: Methodological innovation has fundamentally resolved the issue of learning motivation, shifting from “coercion” to “self-discipline” (63.3% growth). More importantly, the majority of the experimental group (78.5%) achieved Level 3 Competency the level of proficiency and self-application of skills in life, perfectly meeting the requirements of the 2018 Program.

Recommendations and Future Directions: To maintain effectiveness, educational institutions should standardize digital resource systems for flipped learning and build a bank of interdisciplinary PE projects. Subject assessment should shift from pure performance measurement to process-based assessment of competency development and the growth of qualities such as Diligence and Responsibility.

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