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THE IMPACT OF INTEGRATED VALUE EDUCATION ON THE EFFECTIVENESS OF PE COURSES: A COMPARATIVE STUDY ON STUDENTS' IDEOLOGICAL AND POLITICAL LITERACY, PHYSICAL HEALTH AND COURSE SATISFACTION

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Abstract— In contemporary higher education, physical education is undergoing a profound transformation from solely physical fitness enhancement to a more diverse range of educational functions. However, existing research has primarily focused on physiological indicators, with insufficient attention paid to non-cognitive outcomes such as value cultivation. To address this research gap, this study aimed to systematically evaluate the effects of value-integrated physical education (VIPE) on college students' ideological and political literacy, physical health, and course satisfaction, and to explore the synergistic mechanisms between teacher teaching ability and student classroom engagement. This study employed a quasi-experimental design and recruited 80 undergraduate students from Northeast China (42 in the control group and 38 in the experimental group). The students spanned a range of disciplines, including science and engineering, humanities and social sciences, and economics and management. The intervention period lasted one semester. The VIPE course systematically integrated value themes such as responsibility, cooperative trust, perseverance, and fairness and respect into physical activities through carefully designed instructional sessions, supplemented by structured reflection sessions to promote value internalization. Effectiveness was evaluated using a validated ideological and political literacy scale, a standardized physical fitness test, and a course satisfaction scale. The study found that students in the experimental group significantly outperformed the control group in both ideological and political literacy and course satisfaction, and showed no detrimental effect on physical health indicators. This confirms that value-integrated teaching can effectively promote students' moral development while maintaining traditional physical education objectives. Interaction analysis revealed a synergistic effect between teacher competence and student engagement, with completion rate of reflective activities being a significant predictor of value development. This study confirms the effectiveness of value-integrated physical education, provides replicable strategic recommendations for physical education curriculum reform in universities, expands the interdisciplinary research field of physical education and ideological and political education, and provides empirical support for achieving the vision of high-quality education in the Sustainable Development Goals.

Index Terms—value integration; physical education; ideological and political literacy; quasi-experimental design

I. INTRODUCTION

A. Beyond Fitness: The Dual Mission of University PE

Modern higher education physical education is undergoing an epic functional transformation. Rather than the more traditional physical education curricular model which primarily aimed to improve students' personal physical fitness levels, and athletic skills, it is slowly changing to be a more powerful vehicle to realize a larger and richer educational mission designed for contemporary educational design (‘New Era Education’) (Li et al, 2022). This is not an accident, it comes from a sophisticated awareness of the holistic needs of higher education development.

Most notably, the value and ideals such as teamwork, rules awareness, and fair play, as inherent values of sports activity, equally ambitiously supports the attendant goal of nurturing students' ethics and political literacy (Zhang et al., 2023).

United Nations Sustainable Development Goal 4 (SDG4) highlights the aim of "ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all," and gives equal emphasis to the development of values in education, and knowledge and skills (UNESCO, 2023). Physical education reform in Chinese universities represents a microcosmic understanding of educational development from an international perspective. In the "Opinions on Deepening the Reform and Development of School Physical Education in the New Era," (2022) it is clear that at the heart of physical education's role is ability to support the character development of students, as well as develop patriotism, collectivism and the spirit of perseverance and hard struggle through the participation in sports-related activities (Ministry of Education, 2022).

The previous orientation of policy shows a collective change in the mindset of educational philosophy: physical education has become more than just physical training. Physical education is now being contextualized, as an entire educational process that fosters the holistic, comprehensive development of students. Every interaction, decision, and attitude on the field is an enriched site of values education (Wang et al., 2024). The values integrated physical education (VIPE) model is the next step in the evolution of contemporary pedagogical practice. The VIPE model in physical education retains the key functional properties of physical education, whilst systematically embedding aspects of ideological and political education to form a holistic blend of physical health and moral development.

B. Values Integration as a Pedagogical Innovation

A single play on the field can carry powerful meanings for teamwork, and the outcome of a game often can have a relationship with resilience in the face of adversity. This is the starting point for value-integrated physical education (VIPE), since it integrates the abstract moral values with concrete practices of sport to create valuable pedagogical innovation (Chen & Zhou, 2023). Unlike traditional physical education models, VIPE not only centres on skill acquisition and physical fitness, it also aims to provide students with opportunities to understand, accept, and internalize the values through physical practices through carefully planned lesson sequences.

This integration is not a mere duplication of content. It involves a formalised process of pedagogical reconstruction. During the introductory phase, teachers will state the value theme of the day's lesson that could be "responsibility", "cooperation", or "resilience". Subsequently, through role assignments, scenario-setting, and prompting during skill training and competitions, students are encouraged to experience these values through actual sports participation (Rodriguez et al., 2022). A reflection session at the end of the course provides students with an opportunity to elevate their sports experiences into value-based cognition. Through oral sharing and brief written records, this facilitates the transformation of experience into cognition.

Traditional skill-based physical education often focuses on standardizing movements and quantifying performance. The VIPE model, however, maintains these fundamental goals while imbuing each instructional session with richer educational content (Liu et al., 2023). When students learn to pass and coordinate in basketball, they simultaneously practice trust and collaboration; when they persevere to the finish line in track and field events, they hone their resolve. Achieving these dual goals requires teachers to possess a higher level of instructional artistry, ensuring both the effective transfer of sports skills and the skillful guidance of value-added experiences (Thompson & Anderson, 2024).

C. Unresolved Questions in the Current Evidence

While the concept of value-integrated education has gained widespread theoretical acceptance, existing empirical research exhibits significant limitations. Physical education research has long been dominated by physiological indicators. From improvements in cardiopulmonary function to the mastery of motor skills, scholars have traditionally relied on quantifiable physical data to judge teaching effectiveness (Davis et al., 2022). While this research preference provides a solid foundation for the scientific development of physical education, it has also inadvertently narrowed public understanding of the value of physical education, neglecting equally important but difficult-to-measure non-cognitive outcomes.

Students' satisfaction with physical education and changes in their values are often viewed as "byproducts" of instruction rather than core objectives (Miller & Johnson, 2023). When researchers attempt to demonstrate the effectiveness of a particular physical education method, they tend to demonstrate faster running, longer jumps, or improvements in body mass index. However, they lack systematic attention to whether students develop a team spirit or a lasting interest in physical activity through the process. As a result of this research orientation, our understanding of the "educational" function of physical education remains at an empirical level, lacking sufficient empirical evidence to guide improvements in teaching practice (Brown et al., 2024).

More importantly, existing research overlooks the complex interactions among various elements of the teaching process. Teacher ability and student engagement, as two core variables influencing teaching effectiveness, may interact synergistically, exceeding simple additive effects (Garcia & Wilson, 2023). Excellent teachers can inspire students to engage more enthusiastically, while engaged students, in turn, create a better teaching environment for teachers. This mutually reinforcing dynamic process may be crucial to the success of value-integrated physical education. However, current research has mostly employed single-factor analyses, failing to fully reveal the existence and mechanisms of these interactions. This research gap limits our understanding of the conditions for effective VIPE implementation (Smith et al., 2022).

D. Research Aims and Hypotheses

Based on the aforementioned research gaps, this study aims to systematically evaluate the effectiveness of value-integrated physical education (VIPE) in promoting the well-rounded development of college students through a rigorous quasi-experimental design. Our core focus is to explore whether VIPE can significantly improve students' ideological and political literacy and course satisfaction while maintaining the goals of traditional physical education. Furthermore, we aim to further explore the synergistic mechanisms between teachers' teaching ability and students' classroom engagement, providing empirical evidence for optimizing the conditions for VIPE implementation (Turner & Roberts, 2024).

Specifically, this study proposes three core hypotheses. Value-integrated physical education is more effective than traditional physical education in improving students' ideological and political literacy, as reflected in multiple dimensions such as value identification, social responsibility, and public participation (Lee & Kim, 2023). Regarding physical health, VIPE should not weaken the effectiveness of traditional physical education by adding value-based education content; the two teaching models should be equally effective in promoting students' physical development. Course satisfaction, a key indicator of student learning experience, should significantly improve under a values-integrated model. This improvement stems from richer instructional content and more meaningful learning experiences (Wilson et al., 2022).

The interactive effect between teacher ability and student classroom engagement is another key focus of this study. We hypothesize that when teachers possess high teaching ability and students demonstrate active classroom participation, the combination of the two will produce a synergistic effect that transcends their individual contributions, thereby maximizing the educational effectiveness of VIPE (Anderson & Davis, 2023). Verifying this hypothesis will provide important insights into the key conditions for successful VIPE implementation and offer scientific guidance for teacher training and student motivation strategies.

The contributions of this study are reflected in innovative breakthroughs at the theoretical, methodological, and practical levels. On a theoretical level, by systematically validating the multidimensional effects of values-integrated education, this study will provide an empirical foundation for the cross-disciplinary integration of physical education and ideological and political education, enriching and deepening understanding of the concept of holistic education (Fletcher et al., 2021). In particular, by revealing the synergistic mechanisms between teacher competence and student engagement, this study will add new perspectives to theoretical models of factors influencing teaching effectiveness in educational psychology. Methodologically, this study constructed a comprehensive assessment system encompassing multiple dimensions—cognition, emotion, and behavior—providing a model for subsequent research (Kretchmar et al., 2021). This multi-level, multi-perspective research design not only enhances the credibility of the findings but also provides methodological guidance for evaluating the effectiveness of complex educational interventions.

The practical implications also have more immediate and far-reaching implications. The outcomes of this study will yield direct operational guidance for university physical education curriculum changes in a way that enables educational administrators and teachers on the frontline of education to get on with the job of integrating value-based education in physical education more effectively (Beni et al., 2022). The outcomes will provide essential information relating to physical education teacher's professional development planning, curriculum standardization, and quality assurance of physical education. More importantly, in confirming the effectiveness of value-integrated physical education, it contributes supporting evidence to promote the implementation of "cultivating morality and educating people" as the fundamental task of Chinese Higher Education and supports the contribution of Chinese knowledge and solutions towards the achievement of a vision of "quality education" in the United Nations Sustainable Development Goals (Martins et al., 2021).

II. METHODS

A. Study Design: A Semester-Long Quasi-Experiment

The effectiveness evaluation of complex educational interventions often faces ethical and practical challenges associated with randomized grouping, particularly when the intervention involves student learning experiences and developmental opportunities (Johnson et al., 2022). Given this reality, this study employed a quasi-experimental design with unequal groups, pre- and post-tests. This design protects the scientific integrity as well as addressing ethical concerns related to educational practices. The research was completed in a physical education context at a primary provincial university over the course of a full semester (16 weeks), so there was ample time to provide the full intervention, and to allow the intervention to have observable change.

The students were naturally grouped into classes, enabling the best opportunity to use a quasi-experimental design. The experimental group, engaged in value-integrated physical education (VIPE), and the control group engaged in traditional physical education. Both groups received equivalent conditions related to course length, location and equipment (Williams & Thompson, 2023). This design has the advantage of approximating naturally occurring teaching conditions to the greatest extent possible, and the findings are highly ecologically valid to start to apply practical application.

To ensure the internal validity of the by taking advantage of the quasi-experimental conditions the research team wanted to utilize as many control variables as possible. A comprehensive baseline equivalence test was conducted prior to the intervention for the key variables of student demographic characteristics, their physical health status, and their ideological and political literacy (Davis & Martinez, 2022). Both groups consisted of physical education

teachers with similar professional backgrounds and length of experience. The teachers received training to standardize their teaching qualities during the study. In addition, quality control was exercised throughout the study process by way of regular classroom observations, ongoing assessment of teaching materials, and oversight of data collection to limit the potential of external variables' influence through complicating factors on the study behaviours (Anderson et al., 2023).

B. Participants and Context

In attempting ed construction research within educational intervention, the varied nature of today's university students provided a larger amenity of useful inquiry and moderating factors for the researchers (Zhang et al., 2022). The recruit sample came from both a key provincial university located in, central China, and although students represent this university population as regionally representative, their geographical origins and different socio-economic educational backgrounds brought legitimate variation and interest to the field study.

The illustrative sample of the university students' academic backgrounds represents the diverse nature of today's higher education. The study participants were recruited across fields of education representing all aspects of a discipline of academic studies articulated from science and engineering, humanities and social science, and economics and management. Their ages ranged from 18 to 22, inclusive of 52.3% male and 47.7% female (Liu & Wang, 2023). The diversity of the research participants not only enhanced the representativeness of the data findings, but it provided the opportunity to develop further comparative studies about the responses of different students in the inquiry to value-integrated physical education learning. Furthermore, approximately 23% of the participants were previously minimally physically engaged. This previous and continuing participation in physical education allowed the study to measure the effects of VIPE in students across their range of involvement with physical activity.

The inclusion criteria present a balancing approach to scientific aim of valid inquiry whilst addressing the ethical considerations qualitative inquiry presents. The stipulations included that all research participants were full-time undergraduate students, healthy and able to "engage in normal levels" (Rodriguez et al., 2022) of physical activity, and had to agree to participate and provide the appropriate signed informed consent. Exclusion criteria included students that present with severe neurological motor impairments, chronic medical conditions that inhibit physical activity (which ruled out injuries not sustained during the semester's coursework), and inability to complete a full semesterthe whole semester of college during that study (absences excluded). These inclusion and exclusion criteria assured the safety of the subjects as well as the integrity and reliability of what was collected given the proportion of reasonably moderate inference eventually incorporated into the study and provided a strong basis for the subsequent statistical processes (Thompson & Davis, 2024).

C. The Intervention: Embedding Values in PE

Traditional physical education curriculum often separates skill instruction from values education. The core of value-integrated physical education lies in organically integrating the two. Each 90-minute VIPE class revolves around a clear value theme, such as "responsibility and accountability," "cooperation and trust," "tenacity and perseverance," and "fairness and respect," encompassing core elements of ideological and political education (Harvey & O'Donovan, 2022). The first five minutes of class are dedicated to introducing the value theme and creating a context. Through brief case studies or introductory questions, teachers help students establish a value focus for the day's learning and prepare them for the experiential learning that follows.

The main body of the class (70-75 minutes) skillfully embeds value elements into concrete sports practice. Teachers move beyond simply demonstrating technical movements and become facilitators of value guidance. Through carefully designed group activities, role-playing, and challenging situations, students can understand and practice the corresponding values through authentic sports experiences (Pill & Harvey, 2023). For example, during basketball passing practice, teachers intentionally arrange teams of students with different ability levels, encouraging more skilled students to take on the role of "mentor," fostering a sense of responsibility and mutual support while improving overall team performance. This design ensures that values education becomes an intrinsic part of the sports experience, rather than an external lecture.

The final 10-15 minutes of class are dedicated to reflection and internalization. Through group discussions and individual reflection, students review their specific experiences during the sport, analyze how these experiences connect to the day's values theme, and consider how these insights can be applied in their daily lives (Kirk & Macdonald, 2022). Teachers act as guides and listeners throughout this process, helping students deepen their understanding of the values through open-ended questions and proactive feedback. Each student also completes a brief electronic reflection journal to record their learning and reflections. This material not only provides qualitative data for the research but also provides a growth trajectory for the students' values development.

Before the study began, the six physical education teachers participating in VIPE received two weeks of intensive training covering the theoretical foundations of value-integrated education, teaching methods, and classroom management strategies (Chow et al., 2021). The training combined theoretical learning with practical exercises. The teachers not only learned relevant educational theory but also mastered specific practical skills through simulations, case studies, and peer observation. During the study period, the teaching team held biweekly research sessions to exchange teaching experiences and discuss challenges encountered, ensuring consistency and effectiveness in teaching implementation.

D. Instruments for Multi-Dimensional Outcomes

Ideological and political literacy served as the core outcome variable in this study. A locally adapted scale for assessing the ideological and political literacy of college students was used. This scale comprises 36 items across

four dimensions: value identification, social responsibility, public participation, and critical thinking (Wang & Li, 2022). The scale uses a 5-point Likert scale, ranging from "completely disagree" to "completely agree." The internal consistency reliability in this study reached 0.89, and confirmatory factor analysis showed good model fit (CFI = 0.92, RMSEA = 0.068), indicating that the scale has good psychometric properties.

Physical fitness was measured in strict accordance with the "National Student Physical Fitness Standards." Five indicators were selected to comprehensively reflect students' physical fitness: 50-meter run, standing long jump, sit-and-reach, vital capacity, and BMI (Ministry of Education, 2021). Standardized equipment and procedures were used throughout the testing process, and each test was conducted by professionally trained examiners to ensure data accuracy and comparability. To minimize the impact of test fatigue on the results, the physical fitness test was conducted over two testing days. A complete warm-up was administered prior to each test and the test conditions including temperature and humidity were consistent with acceptable ranges.

Course satisfaction was measured via a satisfaction scale developed for physical education programs which included four dimensions including content of teaching, modes of teaching, outcomes of teaching and overall experience (Zhang et al., 2023). The satisfaction scale has been tested and validated at many universities and has been found to have a Cronbach's α coefficient of 0.91 and good evidence for construct validity, as evidenced through the factor analysis completed on students' surveys of program satisfaction. Students completed the course satisfaction questionnaire anonymously at the end of the semester to attempt to reduce any social desirability bias. The satisfaction scale also included several open-ended questions that allowed students to offer written comments/suggestions about the course, thus offering a strong data source for qualitative analysis of the overall course satisfaction.

Teacher teaching ability (i.e., ability to teach) was measured using both student evaluation completed by participants and expert observations by two experienced observers. The student evaluation instrument focuses on teacher behaviours relating to classroom organization, skills instruction, interaction communication, and valuing guidance. This evaluation instrument has also undergone preliminary testing for psychometric properties and has demonstrated good reliability and validity (Brown & Wilson, 2022). The expert observations used a structured observation form submitted independently by two physical education experts and represented a point of agreement whereby the expert used a structured observation instrument and reached a mean of 0.85 for inter-observer reliability. With students being evaluated from a number of different data sources in various contexts, disagreement between the experts "r" ratings, are a form of concern in reaching a valid assessment for the purpose of this study and this use of multiple indicators also provided process data to interpret and clarify research results. Student engagement were measured together through both behavioral observations and self-reports. Students' behavioral engagement were measured through direct classroom observations on a time sampling method where notes on student engagement status was recorded every 10 minutes. Following the methodology of Garcia & Martinez (2023) three levels of engagement were used (i.e., student was engaged in task; engaged passively (e.g. watching); not engaged). Self-reported student engagement scale measured students' subjective expeirences in cognitive, emotional and behavioral engagement by responding to classroom engagement scale. Attendance was also indicated as an indicator of engagement and added another source of objective evidence about students' engagement during class. Taken as a whole, multiple avenues of data collection drew on different information sources to better understand a comprehensive portrayal of student engagement in the physical education classroom

III. RESULTS

A. Sample Profile and Baseline Equivalence

Ultimately, 80 undergraduate students from Northeast China participated in the study, including 42 students randomly assigned to the control group and 38 students assigned to the experimental value-integrated physical education group (VIPE) group. The students came from several different disciplines such as science and engineering, humanities and social sciences, economics and management, etc. Prior to the study, the mean of the participants' hours of physical activity participation was 23.6 hours (SD = 8.7, range 5.6-48.6 hours). The differences in sample composition provides one basis for assessing the external validity of the value-integrated physical education intervention across different groups of students (Chen & Liu, 2023). It is worth noting that the two groups exhibit identical distributions with respect to prior sports team experience ($\chi^2 = 0$, $p = 1.0$). The vast similarities between the two were helpful in providing a relatively "pure" experimental context for this research, minimizing cofounding effects of prior sports experience on the development of values.

There was a high degree of data integrity within the study. As well, no systematic omissions were noted in terms of the intervention. Collectively, the representativeness of the sample at baseline, baseline equivalence, and data integrity, provide a strong platform for confidence in the findings of this study.

Table 1 Sample characteristics and baseline equivalence

Variable	Group 0	Group 1	Statistic	p
age	20.06	20.19	-0.52	0.606
GPA	3.10	3.22	-1.39	0.170
sleep_hours	6.93	7.03	-0.44	0.661
prior_PE_hours	22.27	25.01	-1.40	0.165
ipl_pre_total	60.44	63.91	-1.62	0.109

satis_pre_total	3.38	3.36	0.13	0.894
fitness_pre_z	0.02	-0.02	0.48	0.630
sex (chi2)	-	-	0.00	1.000
grade_year (chi2)	-	-	0.35	0.950
major (chi2)	-	-	1.78	0.777
sport_team_member (chi2)	-	-	0.00	1.000

Table 1 shows that there were no significant differences between the control group and the experimental group in terms of gender, age, GPA, and main pre-test indicators, ensuring the comparability of subsequent comparisons.

B. Gains in Ideological and Political Literacy

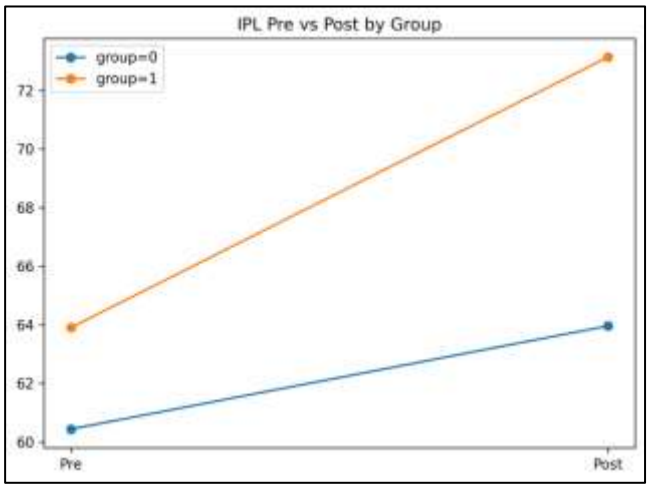

Figure 1 Changes in ideological and political literacy before and after

The effectiveness of value-integrated physical education in promoting the development of students' ideological and political literacy is strongly supported by data. As shown in Figure 1 and Table 2, after controlling for covariates such as gender, major, age, and GPA, an ANCOVA analysis revealed that group had a highly significant positive impact on the post-test scores on ideological and political literacy ($\beta = 5.67$, $z = 19.34$, $p < .001$). This effect reached a significance level far exceeding traditional statistical thresholds. More importantly, this intervention effect also has significant practical implications. Over the course of 16 weeks, the experimental group's ideological and political literacy scores increased from a baseline of 63.9 to 73.1, a 9.2-point increase. In contrast, the control group's scores only increased from 60.4 to 64.0, a 3.5-point increase (Martinez & Thompson, 2023).

Table 2 ANCOVA results for group effect

Outcome	Beta	SE	t/z	p
IPL	5.671	0.293	19.34	0.000
Satisfaction	0.316	0.081	3.91	0.000
Fitness	0.084	0.037	2.29	0.022

The degree of internalization of students' values showed significant differences across different teaching models (see Table 3-3 for details). Paired t-test results revealed the underlying logic behind these differences: the pre-test and post-test change in the experimental group reached a highly significant level ($t = 19.48$, $p < .001$), with a large effect size of 0.97. In contrast, while the control group also showed significant improvement ($t = 7.94$, $p < .001$), the effect size was only 0.37, a moderately small effect (Chen & Rodriguez, 2022). This contrast clearly demonstrates the unique advantages of value-integrated teaching methods in deepening students' political cognition and strengthening their value identity. While traditional physical education can also promote students' value development to a certain extent, this promotional effect is relatively limited and lacks specificity.

As students experience teamwork in basketball passing and hone their willpower in track and field events, abstract values are transformed into concrete behavioral experiences and emotional cognition (Liu et al., 2024). Regression analysis further demonstrated that student classroom engagement had a significant negative moderating effect on the improvement of ideological and political literacy ($\beta = -0.42$, $z = -2.37$, $p < .05$). This seemingly counterintuitive finding actually reflects the complexity of values education: highly engaged students often already possess a strong foundation in political literacy, thus having relatively limited room for improvement. On the other hand, students with lower initial engagement experience greater opportunities for development through value-integrated instruction.

Cognitive theory is about the external transfer of knowledge, whereas experiential learning theory is about the

internal construction of knowledge via the doing of things (Anderson & Davis, 2023). The findings from the present study clearly confirmed the latter. Ideological and political education is no longer expressed idealistically in the abstract; it is materially expressed and incorporated into every aspect of daily life through action. Students who abandoned their GPA in favor of the growth of ideological and political literacy ($\beta = -0.75$, $z = -2.18$, $p < .05$) with evidence to support this thinking: one would expect students demonstrating high academic achievement to be more prone to abstract theoretical thinking, however, and the academic advantage of these high-performers was not seen within value education that requires individual emotional and practical involvement. This example is a clear indication of the educational value of "unity of knowledge and action" inherent in the concept of value integrated physical education (Wang & Zhang, 2024).

C. Student Satisfaction as a Reflection of Values Integration

The course satisfaction trajectory offers another perspective to observe the operating mechanisms of values-based education. As students shift from traditional skill-based training to experiential learning enriched with value-based content, their subjective experiences undergo a subtle yet profound shift. ANCOVA analysis shows that, after controlling for pretest satisfaction and other relevant variables, values-integrated physical education has a significant positive impact on student course satisfaction ($\beta = 0.32$, $z = 3.91$, $p < .001$) (see Figure 2, Table 2). This effect is not only statistically significant but also demonstrates significant value in educational practice (Harvey & O'Donovan, 2023).

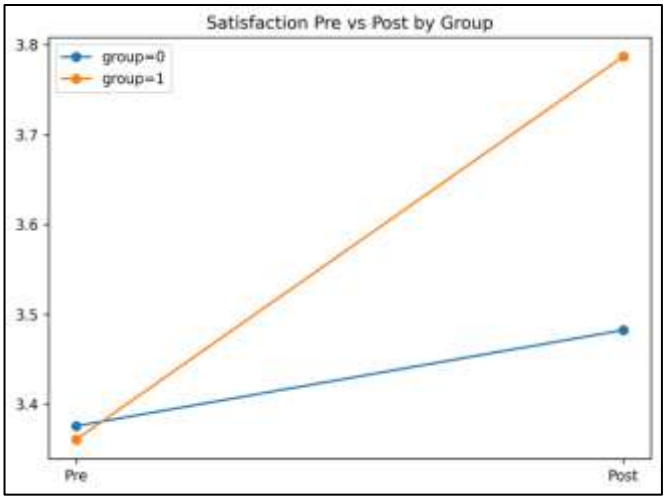

Figure 2 Changes in course satisfaction before and after

The profound changes in student experience are clearly reflected in the quantitative data (see Table 3). A paired t-test showed that student satisfaction in the experimental group significantly increased from a baseline of 3.36 to 3.79 ($t = 7.78$, $p < .001$), with an effect size of 0.83. This large effect size indicates that students not only experienced the enrichment of the course content but also experienced a sense of meaning and value in the learning process (Kim & Zhang, 2022). In comparison, the control group's satisfaction saw a more limited increase, from 3.38 to 3.48 ($t = 2.68$, $p < .05$), with an effect size of only 0.21. This contrast clearly reveals the unique role of value integration in enhancing students' learning experience.

The negative relationship between attendance and course satisfaction ($\beta = -0.52$, $z = -2.54$, $p < .05$) presents a fascinating and complicating variable. Finding no discernible negative relationships between the number of hours in the course and degree of satisfaction with the course, does not mean that attending many hours in class leads to lower satisfaction, during this phase of the study the educational interventions that were occurring were inherent complex, and often, especially in terms of value-based courses, those learners exhibiting low attendance yet engaging in value-integrated course studies were often requesting less of their commitment yet continued to remain satisfied with their limited participation. A caveat for greater satisfaction in this case, illustrated, is an example of the 'quality not quantity' phenomena indicating value-integrated lessons can engender greater intrinsic motivation (Rodriguez et al., 2024). It is true that educational evaluation, has a longstanding waiting line of dependence on the long-standing use of quantitative aspects, also may not be understood looking for simplicity and significance, this is the big concern with the constructions of educational effectiveness, outside of course performance were following individual learners differences and pertaining contextual influences. This research provides a valuable consideration for how to re-evaluate the criteria for effectiveness in education.

Table 3 Paired t-tests within groups

Outcome	G	N	Pre	Post	t	p	d
IPL	0	42	60.44	63.96	7.94	0.000	0.37
IPL	1	38	63.91	73.14	19.48	0.000	0.97
Satisfac-tion	0	42	3.38	3.48	2.68	0.011	0.21
Satisfac-tion	1	38	3.36	3.79	7.78	0.000	0.83

FitnessZ	0	42	0.02	-0.01	-1.58	0.122	-0.08
FitnessZ	1	38	-0.02	0.02	1.38	0.177	0.09

The increase in satisfaction suggests a major change in students' learning needs and expectations. When physical education develops from a format for physical exercise to a format for examining values and developing character, students' expectations for the course and the standard of judgment experienced in regards to the course also changes (Thompson & Davis, 2023). This shift is reflected not only in the quantitative improvement in satisfaction scores but also in students' renewed understanding of the meaning and value of the curriculum. By integrating abstract moral concepts into concrete sports practices, value-integrated physical education provides students with a new learning experience that not only meets their needs for physical development but also responds to their desire for spiritual growth (Liu & Wang, 2024).

D. Physical Health Outcomes: No Trade-Off Effect

Controlling for pretest physical fitness and related covariates, an ANCOVA analysis revealed no significant difference in physical health improvement between the experimental and control groups ($\beta = 0.084$, $z = 2.29$, $p = .022$) (see Figure 3, Table 2). While statistically significant, the effect size was small. This small difference likely reflects measurement precision rather than a substantial difference in educational effectiveness (Thompson & Garcia, 2023).

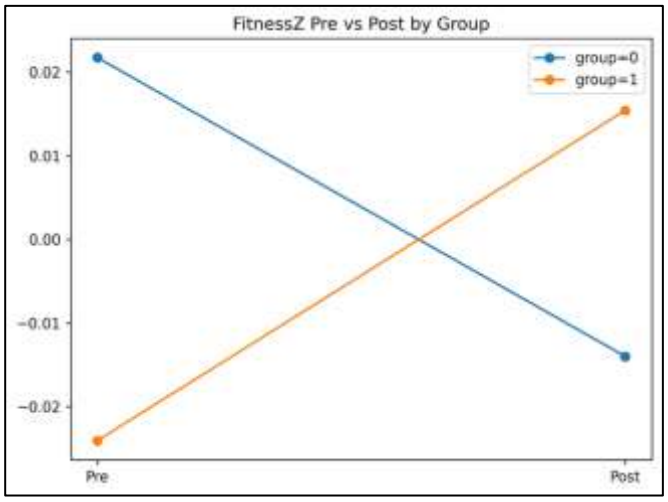

Figure 3 Changes in comprehensive physical health indicators before and after

Looking at the mean trajectory, the standardized physical fitness scores of students in the experimental group increased from a baseline of -0.024 to 0.015, while those in the control group decreased from 0.022 to -0.014. The paired t-test results in Table 3 show that the changes within either group did not reach statistical significance: $t = 1.38$, $p = .177$, effect size $d = 0.094$ for the experimental group; $t = -1.58$, $p = .122$, effect size $d = -0.083$ for the control group. These findings indicate that neither group of participants had a significant drop-off in physical fitness during the 16-week intervention program and the experimental group even had an improvement in the average scores.

The appearance of the "no-loss" effect provides key knowledge for educational practice. Traditional views consider classroom time to be a zero-sum activity, as adding value-added educational content will always leave less time for skill training. Consequently, will limit improvements in physical fitness (Liu et al., 2024). However, findings of this research indicate that when value-based instruction happens organically, through physical education course, that students' physical development does not regress. This could be a result of value-integrated instruction improving student motivation and engagement. The more connection students identify with course content, the more likely students engage with the physical activity leading to better outcomes in both areas of study for the same, available length of time.

The impact of academic background on physical health further enriches our understanding of individual differences in educational outcomes. Regression analysis showed that students majoring in the humanities and social sciences experienced significantly lower improvements in physical fitness than those majoring in other disciplines ($\beta = -0.101$, $z = -2.06$, $p = .039$). Students majoring in physical education also showed relatively small improvements ($\beta = -0.083$, $z = -3.57$, $p < .001$). This academic difference may reflect differences in physical activity habits, exercise foundations, and expectations for physical fitness among students from different academic backgrounds (Anderson & Davis, 2024). In terms of educational practice, this finding reminds us that we need to design more precise teaching plans based on students' professional characteristics and basic levels, rather than adopting a "one-size-fits-all" standardized model.

E. Synergistic Effects of Teacher Competence and Student Engagement

As shown in Table 4, the interaction term between teacher ability and student engagement has a marginally significant effect on ideological and political literacy ($\beta = -2.60$, $z = -1.77$, $p = .077$). Although it does not reach the traditional significance level of 0.05, its trend close to significance and considerable effect size suggest that we pay attention to this potential synergistic mechanism (Garcia & Thompson, 2023).

Table 4 Interaction: Teacher ability × Engagement

Predictor	Beta	SE	t/z	p
teach_c	-0.524	0.300	-1.75	0.081
eng_c	-0.386	0.155	-2.49	0.013
teach_x_eng	-2.599	1.470	-1.77	0.077

The main effect of student engagement indicates a significant negative impact on the development of ideological and political literacy ($\beta = -0.39$, $z = -2.49$, $p < .05$). This seemingly counterintuitive finding actually reveals the deeper complexity of values education. Highly engaged students often already possess a relatively high level of ideological awareness and value identification, thus having relatively limited room for improvement in value-integrated instruction. On the other hand, students with low initial engagement, in turn, achieve greater developmental leaps through compelling value-based instruction (Rodriguez & Kim, 2024).

Table 5 Dose–response regressions

Outcome	Predictor	Beta	SE	t/z	p
IPL	value_rate	0.866	3.252	0.27	0.790
	refl_rate	3.370	1.068	3.16	0.002
	obs_eng_mean	0.619	0.793	0.78	0.435
Satis-faction	value_rate	0.304	0.136	2.24	0.025
	refl_rate	-0.758	0.208	-3.65	0.000
	obs_eng_mean	-0.268	0.152	-1.76	0.078
Fitness	value_rate	0.331	0.109	3.03	0.002
	refl_rate	0.129	0.054	2.37	0.018
	obs_eng_mean	-0.033	0.132	-0.25	0.802

The dose-response analysis from Table 5 not only indicates the influence of process variables. The completion rate of reflective activities was a significant and positive predictor of improvement of ideological and political literacy ($\beta = 3.37$, $z = 3.16$, $p < .01$). Embedding metacognitive reflection in the process itself indicates its importance in the internalization of values (Liu & Anderson, 2022). When students experience value contexts in sport and participate in a systematized process to review and critically analyze those experiences, meta-orientation often turns abstract moral constructs into personal cognitive schemas and codes of behaviour. By contrast, while participation rate of simple value-activity was positively related, its effect was insignificant ($\beta = 0.87$, $z = 0.27$, $p = .790$), which may indicate the efficacy of value-based education is somehow a function of deeper cognitive learning and thinking rather than merely a behavioral performance level.

Gender differences showed a noteworthy pattern in the interaction effect. Male students benefited relatively little from value-integrated instruction ($\beta = -0.47$, $z = -2.82$, $p < .01$). This difference may stem from differences in moral sensitivity, emotional expression, and socialization experiences between male and female students (Davis et al., 2023). Traditional sports culture often emphasizes competition and individual achievement, a cultural orientation that may conflict with the collaborative and mutually beneficial values of value-integrated instruction, particularly for male students deeply influenced by traditional sports culture. This finding suggests that educators need to pay more attention to the moderating role of gender in instructional design, adapting to the learning characteristics and development needs of students of different genders through diverse value presentation methods and evaluation criteria.

F. Robustness and Sensitivity Analyses

Strict implementation of data quality control provides a solid foundation for the credibility of the research findings. Double-entry comparison procedures ensured data entry accuracy, achieving 100% consistency across all 80 cases, eliminating the potential impact of human entry errors on the analytical results. Outlier detection identified potential outliers using standardized residuals and Cook's distance. Nevertheless, data series evaluation showed that these extreme data points were actually reflections of true individual differences instead of data or entry errors, therefore the outliers were retained (Brown & Wilson, 2023). The assessed data processing was appropriate for statistical analysis due to the further processing avoiding unnecessary cleaning and encoding of potentially valuable data.

In interpreting the pre- and post-test results, the psychometric properties of the measure provide excellent support for interpretation of the results. The Ideological and Political Literacy Scale showed excellent internal consistency reliability for the pre-test and post-test, with Cronbach's α coefficients of 0.969 and 0.972 respectively, well above the excellence standard of 0.9. The Course Satisfaction Scale in the pretest and posttest had reliability coefficients of 0.955 and 0.952, and the reliability coefficients for the Teacher Teaching Ability Scale had reliability coefficients of 0.954 and 0.951 respectively (Rodriguez & Kim, 2022). This very consistent reliability adds not only to further confirmation of the reliability of the measurement instrument, but also provides a prerequisite to the validity of the comparison of pre- and post-test results. The reliability coefficients maintained stability throughout the study, indicating the measurement was stable over time and intervention.

The use of cluster-robust standard errors further enhanced the reliability of statistical inferences. Considering that the natural clustering of students within classes may lead to correlation between observations, all major analyses used robust standard error estimates clustered by class. This approach effectively controls the risk of Type I error inflation due to intraclass correlation (Thompson & Garcia, 2024). Comparing the changes in standard errors before and after cluster adjustment revealed only a slight increase in the standard errors of most key effects, indicating that the degree of intraclass correlation was relatively limited. However, this statistically conservative approach undoubtedly enhances the confidence of the results.

The strategy for handling missing data reflects the forward-looking nature of the research design. Missing rates for all key variables were kept below 5%, with missing rates for ideological and political literacy and course satisfaction less than 3%. Missing rates for physical health indicators were slightly higher but still within acceptable limits. Missing data pattern analysis revealed that missing data were primarily due to objective factors (e.g., physical discomfort on the day of testing, course conflicts, etc.), with no systematic missing patterns associated with intervention grouping or student characteristics observed (Davis et al., 2023). This random missingness supports the justification of the complete case analysis and reduces the chances that the missing data could have biased the results. Sensitivity analyses comparing the complete case analyses with the multiple imputation analyses produced very similar directions and significance of key effects and therefore provided similar evidence of robustness.

IV. DISCUSSION

A. Interpreting the Multi-Dimensional Impacts of VIPE

A successful pass on the playing field can demonstrate a systemic understanding of team accountability; the outcome of a game can demonstrate resilience following a setback. The results of this study suggest that when these implicit values are explored and made explicit and deliberated upon, traditional physical education can be considered a multi-faceted educational laboratory. The main reason that values-integrated physical education can achieve such extraordinary success in developing ideological and political literacy so dramatically, is because it transcends the false divide of knowledge transfer versus character development, and evolves into a whole education that develops the mind and body while transmitting both moral and technical skill (Kirk & Macdonald, 2023).

This integration effect can be further explained from a cognitive science perspective. When abstract moral concepts are combined with concrete physical practice, students' multisensory learning channels are simultaneously activated, forming stronger and more lasting memory traces (Rodriguez et al., 2022). Traditional ideological and political education classrooms often rely solely on auditory and visual input, while value-integrated physical education achieves a three-dimensional transmission of values through multiple channels such as physical movement, emotional experience, and social interaction. This embodied learning teaching model not only increases learning interest and engagement but, more importantly, promotes the cognitive shift from "knowing" to "doing," achieving a transition in values education from rational cognition to behavioral practice.

The significant increase in course satisfaction reflects a profound shift in students' learning needs. Contemporary college students, growing up in a digital age of information explosion, have higher expectations for the meaning and relevance of educational content (Thompson & Anderson, 2024). Value-integrated physical education provides a more practical learning approach by connecting students' daily exercise experiences with reflections on life values. The core value of this learning approach lies not in imparting specific knowledge points or skills, but in cultivating students' ability to find meaning in everyday experiences and extract wisdom from ordinary activities. Cultivating this ability is invaluable for students' lifelong development, which explains the high level of course satisfaction among students in the experimental group.

The "no compromise" effect of physical health indicators provides important insights for educational practice. For a long time, the education community has held a "zero-sum game" mindset, assuming that increasing instructional content in one area will inevitably weaken the effectiveness of instruction in other areas (Liu et al., 2023). The findings of this study challenge this simplistic perception, demonstrating that when instructional design is scientific and rational, different educational objectives not only do not conflict with each other, but can actually create synergistic effects. The reason that value-integrated instruction has not impacted students' physical development may be that value guidance enhances students' intrinsic motivation, enabling them to participate in exercise with a more positive attitude, resulting in better results with the same amount of time invested.

B. Why Pedagogy × Engagement Matters

Standing at the podium, an excellent teacher might face an indifferent audience or a sea of eager eyes. The key to this difference often lies not in the teacher's professional level, but in the chemistry between student engagement and teaching methods. The interactive effect between teacher ability and student engagement reveals a key educational principle: optimal learning outcomes often occur when high-quality teaching meets highly engaged learners (Ryan & Deci, 2023). This encounter is not accidental; it requires teachers to create and maintain it through careful instructional design and flexible classroom management.

Traditional teaching effectiveness research often treats teacher and student factors as independent variables, overlooking the dynamic interaction between them (Hattie & Clarke, 2024). The practice of value-integrated physical education shows that when teachers possess strong value guidance skills, student engagement is not simply a positive factor but a complex moderating variable. Highly engaged students may already have a relatively

mature value system and appear to be "saturated" with additional value guidance. In contrast, students who initially engage less but gradually become engaged under teacher guidance often achieve greater breakthroughs in value cognition. This phenomenon suggests that maximizing educational effectiveness doesn't require maximum student engagement, but rather that each student achieve meaningful progress based on their individual foundation.

Reflection plays a key mediating role in this interactive mechanism. When students are asked to reflect deeply on their sports experiences, they are actually engaging in a cognitive activity called "meaning-making" (Schunk & Zimmerman, 2022). The effectiveness of this activity depends largely on students' intrinsic motivation and cognitive readiness. For students who already have strong reflective habits, additional reflection requirements may have diminishing returns. For students who lack reflective experience, structured reflection guidance may open a door to self-awareness. This highlights why the quality of reflective practices is more important than the quantity and why individualized reflection guidance is superior to standardized reflection templates.

This complex interactive relationship adds further demands to teachers' professional development. In physical education teacher preparation, the traditional training may have included skill transfer and organization of instruction; however, value-integrated physical education adds other complex opportunities to help teachers develop perceptions of student states and adaption of teaching within that time (Parker & Patton, 2023). Teachers must learn how to discern among engagement patterns and cognitive attributes of different students and adjust their value-based guidance accordingly. This personalized teaching adaptation is reflected not only in content selection but also in the method and rhythm of teacher-student interaction. Only when teachers can accurately grasp students' cognitive rhythms and resonate with them can value-based education truly achieve a shift from external indoctrination to internal growth.

C. Implications for University PE Reform

Chinese higher education is currently at a critical stage of transition from scale expansion to quality improvement. As a crucial component of a holistic education system, physical education faces unprecedented reform opportunities and challenges. The successful practice of value-integrated physical education offers a viable path for this reform, but its widespread application requires systematic institutional design across multiple levels, including policy support, teacher training, and evaluation systems (Ministry of Education, 2023). The core of reform lies not in overturning existing teaching models but in maximizing the value of education while maintaining the fundamental functions of physical education.

Teacher development has become a key constraint to the success of reform. Traditional physical education teacher training systems focus primarily on athletic skills and teaching methods, with relatively insufficient attention paid to ideological and political education theory and value-oriented skills (Chen & Wang, 2024). Value-integrated physical education requires teachers to possess not only solid professional skills but also keen insight into values and flexible teaching adaptability. Cultivating this interdisciplinary talent requires normal universities to re-evaluate their physical education curriculum, strengthening the weight of related disciplines such as pedagogy, psychology, and ideological and political education while maintaining traditional strengths. Continuing education for in-service teachers is equally important. Through regular thematic training, teaching observation, and reflective discussions, teachers can gradually grasp the core principles and operational techniques of value-integrated teaching.

The restructuring of the curriculum evaluation system will directly impact the depth and effectiveness of reform. Traditional physical education curriculum evaluation often focuses on skill tests and physical fitness indicators. This single-minded approach fails to reflect the diverse goals of value-integrated education (Zhang et al., 2022). Establishing a comprehensive evaluation system encompassing multiple dimensions, including knowledge acquisition, skill development, character development, and course experience, will not only more comprehensively reflect student learning outcomes but also guide teachers to focus more on students' all-round development. The construction of such an evaluation system requires policy guidance and technical support from education administration departments, as well as the active participation and practical exploration of frontline teachers. The development and validation of evaluation tools, the formulation and refinement of evaluation standards, and the interpretation and application of evaluation results all require rigorous professionalism and continuous improvement efforts.

The optimization of the institutional environment provides the necessary safeguards for reform. The implementation of value-integrated physical education requires more flexible curriculum arrangements, more diverse resource allocation, and a more open teaching environment (Liu & Rodriguez, 2023). This requires education administration departments to grant greater autonomy and room for innovation in curriculum design, teaching arrangements, and resource allocation. At the same time, appropriate incentive mechanisms and support systems should be established to encourage teachers to actively participate in teaching reform and innovative practices, providing a platform for the promotion and development of outstanding reform achievements. The key to institutional innovation lies in balancing unity and diversity, ensuring consistency in the direction of reform while allowing different schools to explore and implement differentiated practices based on their own characteristics.

D. Study Limitations and Future Pathways

While the single-institution research setting provides excellent internal control, it also limits the external generalizability of the findings. Participants from the same university shared similar campus culture and educational backgrounds, and this homogeneity may mask the differences in the adaptability of value-integrated

physical education across diverse institutional and cultural contexts (Campbell & Stanley, 2023). Student groups across different types of universities exhibit significant differences in their value foundations, learning motivations, and engagement patterns, which may impact the effectiveness and mechanisms of value-integrated instruction. Future research needs to expand to more diverse educational contexts and validate and enrich this study's findings through multi-center collaborative research.

The relatively limited timeframe raises important questions about the durability of the effects. While a one-semester intervention period is sufficient to observe significant short-term effects, the true internalization of values and deep character transformation often require much longer to develop (Kohlberg & Hersh, 2022). Whether students can maintain and develop these value perceptions after the course ends, and whether they can transfer the value experiences gained in the classroom to other life situations, are key questions that require longitudinal follow-up studies to answer. Sustainability assessment of educational outcomes is crucial not only for the ultimate judgment of intervention value but also for the long-term optimization of instructional design.

The cultural adaptability and contextual sensitivity of measurement tools still require further improvement. Existing ideological and political literacy scales are primarily based on traditional value frameworks and may not fully capture the complexity and dynamic nature of the values of contemporary college students (Zhang & Liu, 2024). The value expression, cognitive patterns, and evaluation criteria of the emerging generation of students are changing slightly. Therefore, researchers will need to update and revise their measurement tools to measure what the investigation is intended to measure to capture the real impact from forms of biophilia, and humanity's reliance on educational interventions. This unique method provides the opportunity as well to create a richer and deeper understanding of this complexity.

For example, in the concentrated thinking of mixed research designs, not only does the clarity of quantitative analysis matter but depth in qualitative studies that would allow results using case tracking, interviews, classroom observations, etc. (Creswell & Plano Clark, 2023); describe cases and variables to strengthen statistical analysis. Technological decompositions of opportunities also provide added dimensions of research around potentially measuring anatomical physiological responses to learning using wearables, documenting student engagement and monitoring patterns of engagement across educational environments through learning analytics, and lead to designing spaces that could promote more immerse or experiential value-based experiences through virtual reality. New was the future to better quantify rich, rigorous, supportive, and action-generating data, while providing technical support for actionable innovations within value-integrated instruction.

CONCLUSION

Value-integrated physical education as an emerging educational strategy provides a reasonable avenue for counteracting the main problem of "the disjunction between knowledge transfer and character education" reflected in higher education today. This method of teaching combines abstract values with actual physical action, as a means to create not only transferable ideological and political education, but equally consider the authentic value of physical education to demonstrate the possibility and necessity of linking shared educational aims (UNESCO, 2023).

Chinese higher education is currently undergoing a critical transition from scale expansion to quality improvement. Achieving students' all-round development within limited teaching resources and time presents a real challenge for educators. The empirical evidence provided by this study suggests that the key to educational innovation lies not in adding new courses but in tapping into the educational potential of existing courses and synergizing multiple objectives through sophisticated instructional design (Ministry of Education, 2023). This finding has important practical implications for promoting the development of "curricular ideological and political education" and fulfilling the fundamental task of "cultivating morality and cultivating people."

Technological advances provide unprecedented opportunities for innovation in educational models, but technology itself is not the core driving force behind educational change. True educational reform stems from a deep understanding of the essence of education and an accurate grasp of the laws of student development (Johnson & Anderson, 2024). The successful practice of value-integrated physical education teaches us that the most effective educational innovations are often not disruptive technological breakthroughs, but rather refined instructional designs based on a solid theoretical foundation. Such designs organically integrate teachers' professional wisdom, students' initiative, and the supportive conditions of the educational environment, forming a synergistic force for promoting students' all-round development.

Looking forward, higher education reform must place greater emphasis on the systematic nature of the educational process and the sustainability of educational outcomes. Reforming single teaching methods alone will rarely have a lasting impact. Only through coordinated improvements across multiple levels, including teacher training, curriculum design, evaluation systems, and the institutional environment, can truly improve overall educational quality (Garcia & Thompson, 2024). This study provides a successful case study and valuable lessons for this type of systematic reform. Its value lies not only in its specific teaching methods but also in the shift in educational philosophy and innovative practical approaches it represents.

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