DEVELOPMENT OF SUSTAINABLE STRATEGY OF PHYSICAL EDUCATION TEACHING IN PRIVATE COLLEGES IN SHAANXI PROVINCE

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Title	**Development of Sustainable Strategy of Physical Education Teaching in Private Colleges in Shaanxi Province**
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ABSTRACT

The objectives of this research were: (1) study the current and expected situation of sustainable development of physical education teaching in private colleges in Shaanxi Province. (2) to develop strategies to influence the sustainable development of physical education teaching in private colleges in Shaanxi Province, and (3) to evaluate the feasibility and adaptability of strategy for the sustainable development of physical education teaching in private colleges in Shaanxi Province.

A mixed-methods approach was employed. The sample comprised 200 physical education teachers and sports administrators from eight private colleges, selected through cluster sampling. The primary research instrument was a five-point rating scale questionnaire, with an Index of Item-Objective Congruence (IOC) ranging from 0.60 to 1.00, discrimination indices between 0.42 and 0.89, and a reliability coefficient of 0.88. Additional tools included focus group discussions and expert evaluation forms. Data were analysed using percentage, mean, standard deviation, $PNI_{modified}$ index and content analysis.

The findings were as follows: (1) The current situation of PE teaching was rated at a high level, with faculty development and professional training identified as the strongest area. However, the expected situation was rated at a very high level, indicating critical development gaps, particularly in financial sustainability and community collaboration ($PNI_{modified}$ = 0.52 and 0.46 respectively). The component with

the lowest $PNI_{modified}$ value was Faculty Development and Professional Training ($PNI_{modified}$ = 0.19). (2) The developed strategic framework consisted of one vision, seven missions, seven strategic goals, seven core strategies, seven projects, 31 activities and 31 Key Performance Indicators (KPIs), all tailored to the institutional context. (3) Expert evaluations confirmed that the strategies were highly feasible and adaptable for practical implementation, demonstrating strong alignment with institutional needs and educational policy directions.

This research offers a practical and strategic model for sustainable PE development in private higher education. It provides a foundation for educational policy design, institutional reform and stakeholder engagement. The findings contribute to the advancement of national health goals under the Healthy China 2030 initiative and the international development agenda outlined in Sustainable Development Goal 3 (Good Health and Well-being).

Keywords: Sustainable Strategies, Physical Education Teaching, Private Colleges

ชื่อเรื่อง	**การพัฒนากลยุทธ์เพื่อส่งเสริมการจัดการเรียนการสอนพลศึกษาที่ยั่งยืนในวิทยาลัยเอกชนในมณฑลส่านซี**
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บทคัดย่อ

การวิจัยครั้งนี้มีวัตถุประสงค์เพื่อ (1) ศึกษาสภาพปัจจุบันและสภาพที่คาดหวังของการจัดการเรียนการสอนพลศึกษาเพื่อการพัฒนาที่ยั่งยืนในวิทยาลัยเอกชน มณฑลส่านซี (2) พัฒนากลยุทธ์เพื่อส่งเสริมการพัฒนาที่ยั่งยืนของการจัดการเรียนการสอนพลศึกษาในวิทยาลัยเอกชน มณฑลส่านซีและ (3) ประเมินความเหมาะสมและความสามารถในการปรับใช้ของกลยุทธ์เพื่อการพัฒนาที่ยั่งยืนของการจัดการเรียนการสอนพลศึกษาในมหาวิทยาลัยเอกชน มณฑลส่านซี การวิจัยใช้ระเบียบวิธีวิจัยแบบผสมผสาน กลุ่มตัวอย่างประกอบด้วยอาจารย์พลศึกษาและผู้บริหารด้านกีฬา 200 คน จากมหาวิทยาลัยเอกชน 8 แห่ง คัดเลือกด้วยการสุ่มแบบกลุ่ม (Cluster sampling) เครื่องมือวิจัยหลักคือแบบสอบถามมาตราส่วนประเมิน 5 ระดับ โดยมีดัชนีความสอดคล้องระหว่างข้อคำถามกับวัตถุประสงค์ (IOC) อยู่ระหว่าง 0.60 ถึง 1.00 ค่าดัชนีจำแนกอยู่ระหว่าง 0.42 ถึง 0.89 และค่าความเชื่อมั่นเท่ากับ 0.88 เครื่องมือประกอบด้วยการสนทนากลุ่ม และแบบฟอร์มการประเมินจากผู้เชี่ยวชาญ ข้อมูลถูกวิเคราะห์ด้วยร้อยละ ค่าเฉลี่ย ส่วนเบี่ยงเบนมาตรฐาน ดัชนี $PNI_{modified}$ และการวิเคราะห์เนื้อหา

ผลการวิจัยพบว่า (1) สถานการณ์ปัจจุบันของการจัดการเรียนการสอนพลศึกษาในวิทยาลัยเอกชนอยู่ในระดับสูง โดยปัจจัยด้านการพัฒนาบุคลากรครูมีคะแนนเฉลี่ยสูงที่สุด ขณะที่สถานการณ์ที่พึงประสงค์อยู่ในระดับสูงมาก โดยพบช่องว่างที่ต้องพัฒนาอย่างเร่งด่วนในด้านความยั่งยืนทางการเงินและความร่วมมือกับชุมชน ($PNI_{modified}$ = 0.52 และ 0.46 ตามลำดับ) (2) กลยุทธ์ที่พัฒนาขึ้นประกอบด้วย วิสัยทัศน์ 1 ข้อ พันธกิจ 7 ข้อ เป้าประสงค์ 7 ข้อ กลยุทธ์หลัก 7 ด้าน โครงการ 7 โครงการ กิจกรรมย่อย 31 กิจกรรม และตัวชี้วัดความสำเร็จ (KPIs) จำนวน 31 ตัว (3) ผลการประเมินโดยผู้เชี่ยวชาญพบว่ากลยุทธ์ที่พัฒนาขึ้นมีความเป็นไปได้และสามารถปรับใช้ได้ในทางปฏิบัติสูงสะท้อนถึงความเป็นไปได้ในการนำไปใช้จริง และการสอดคล้องกับบริบทของวิทยาลัยเอกชนในมณฑลส่านซี

งานวิจัยนี้นำเสนอรูปแบบเชิงปฏิบัติและเชิงกลยุทธ์เพื่อการพัฒนาที่ยั่งยืนของการจัดการเรียนการสอนพลศึกษาในระดับอุดมศึกษาเอกชน วางรากฐานสำหรับการออกแบบนโยบายการศึกษา การปฏิรูปสถาบัน และการมีส่วนร่วมของผู้มีส่วนได้ส่วนเสีย ผลการวิจัยยังมีส่วนสนับสนุนต่อการบรรลุเป้าหมายด้านสุขภาพแห่งชาติภายใต้นโยบาย Healthy China 2030 และวาระการพัฒนาระหว่างประเทศตามเป้าหมายการพัฒนาที่ยั่งยืนข้อที่ 3 (SDG 3: Good Health and Well-being))

คำสำคัญ: กลยุทธ์การพัฒนาที่ยั่งยืน, การจัดการเรียนการสอนพลศึกษา, วิทยาลัยเอกชน

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บทคัดย่อ

การวิจัยครั้งนี้มีวัตถุประสงค์เพื่อ (1) ศึกษาสภาพปัจจุบันและสภาพที่คาดหวังของการจัดการเรียนการสอนพลศึกษาเพื่อการพัฒนาที่ยั่งยืนในวิทยาลัยเอกชน มณฑลส่านซี (2) พัฒนากลยุทธ์เพื่อส่งเสริมการพัฒนาที่ยั่งยืนของการจัดการเรียนการสอนพลศึกษาในวิทยาลัยเอกชน มณฑลส่านซีและ (3) ประเมินความเหมาะสมและความสามารถในการปรับใช้ของกลยุทธ์เพื่อการพัฒนาที่ยั่งยืนของการจัดการเรียนการสอนพลศึกษาในมหาวิทยาลัยเอกชน มณฑลส่านซี การวิจัยใช้ระเบียบวิธีวิจัยแบบผสมผสาน กลุ่มตัวอย่างประกอบด้วยอาจารย์พลศึกษาและผู้บริหารด้านกีฬา 200 คน จากมหาวิทยาลัยเอกชน 8 แห่ง คัดเลือกด้วยการสุ่มแบบกลุ่ม (Cluster sampling) เครื่องมือวิจัยหลักคือแบบสอบถามมาตราส่วนประเมิน 5 ระดับ โดยมีดัชนีความสอดคล้องระหว่างข้อคำถามกับวัตถุประสงค์ (IOC) อยู่ระหว่าง 0.60 ถึง 1.00 ค่าดัชนีจำแนกอยู่ระหว่าง 0.42 ถึง 0.89 และค่าความเชื่อมั่นเท่ากับ 0.88 เครื่องมือประกอบด้วยการสนทนากลุ่ม และแบบฟอร์มการประเมินจากผู้เชี่ยวชาญ ข้อมูลถูกวิเคราะห์ด้วยร้อยละ ค่าเฉลี่ย ส่วนเบี่ยงเบนมาตรฐาน ดัชนี $PNI_{modified}$ และการวิเคราะห์เนื้อหา

ผลการวิจัยพบว่า (1) สถานการณ์ปัจจุบันของการจัดการเรียนการสอนพลศึกษาในวิทยาลัยเอกชนอยู่ในระดับสูง โดยปัจจัยด้านการพัฒนาบุคลากรครูมีคะแนนเฉลี่ยสูงที่สุด ขณะที่สถานการณ์ที่พึงประสงค์อยู่ในระดับสูงมาก โดยพบช่องว่างที่ต้องพัฒนาอย่างเร่งด่วนในด้านความยั่งยืนทางการเงินและความร่วมมือกับชุมชน ($PNI_{modified}$ = 0.52 และ 0.46 ตามลำดับ) (2) กลยุทธ์ที่พัฒนาขึ้นประกอบด้วย วิสัยทัศน์ 1 ข้อ พันธกิจ 7 ข้อ เป้าประสงค์ 7 ข้อ กลยุทธ์หลัก 7 ด้าน โครงการ 7 โครงการ กิจกรรมย่อย 31 กิจกรรม และตัวชี้วัดความสำเร็จ (KPIs) จำนวน 31 ตัว (3) ผลการประเมินโดยผู้เชี่ยวชาญพบว่ากลยุทธ์ที่พัฒนาขึ้นมีความเป็นไปได้และสามารถปรับใช้ได้ในทางปฏิบัติสูงสะท้อนถึงความเป็นไปได้ในการนำไปใช้จริง และการสอดคล้องกับบริบทของวิทยาลัยเอกชนในมณฑลส่านซี

งานวิจัยนี้นำเสนอรูปแบบเชิงปฏิบัติและเชิงกลยุทธ์เพื่อการพัฒนาที่ยั่งยืนของการจัดการเรียนการสอนพลศึกษาในระดับอุดมศึกษาเอกชน วางรากฐานสำหรับการออกแบบนโยบายการศึกษา การปฏิรูปสถาบัน และการมีส่วนร่วมของผู้มีส่วนได้ส่วนเสีย ผลการวิจัยยังมีส่วนสนับสนุนต่อการบรรลุเป้าหมายด้านสุขภาพแห่งชาติภายใต้นโยบาย Healthy China 2030 และวาระการพัฒนาระหว่างประเทศตามเป้าหมายการพัฒนาที่ยั่งยืนข้อที่ 3 (SDG 3: Good Health and Well-being))

คำสำคัญ: กลยุทธ์การพัฒนาที่ยั่งยืน, การจัดการเรียนการสอนพลศึกษา, วิทยาลัยเอกชน

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Chapter 1
Introduction

Rationale

In an era characterised by globalisation and profound socio-cultural transformation, the Decade of Education for Sustainable Development (2005–2014), initiated by UNESCO, marked a significant turning point in international education policy. It signalled a global recognition of the essential role that education plays in addressing critical global challenges, including poverty, inequality, environmental degradation, and disparities in health. Education for Sustainable Development (ESD), as defined in UNESCO's Education 2030 Framework for Action (2015), refers to an approach to education that aims to equip learners with the knowledge, skills, values, and attitudes necessary to contribute meaningfully to a sustainable future. This approach promotes inclusive, equitable, and high-quality education, encouraging critical thinking, lifelong learning, global citizenship, environmental responsibility, and the adoption of sustainable lifestyles.

In response to escalating global challenges, the United Nations General Assembly adopted the 2030 Agenda for Sustainable Development in 2015. This transformative agenda outlines 17 interlinked Sustainable Development Goals (SDGs), which serve as a comprehensive blueprint for achieving peace, prosperity, and sustainability for people and the planet. These goals aim to address the world's most pressing issues, including poverty, hunger, health, education, gender equality, clean water and sanitation, clean energy, economic growth, innovation, reduced inequalities, sustainable cities, responsible consumption, climate action, life below water, life on land, justice, and global partnerships.

The 17 SDGs are as follows: (1) No Poverty, (2) Zero Hunger, (3) Good Health and Well-being, (4) Quality Education, (5) Gender Equality, (6) Clean Water and Sanitation, (7) Affordable and Clean Energy, (8) Decent Work and Economic Growth, (9) Industry, Innovation and Infrastructure, (10) Reduced Inequalities, (11) Sustainable

Cities and Communities, (12) Responsible Consumption and Production, (13) Climate Action, (14) Life Below Water, (15) Life on Land, (16) Peace, Justice and Strong Institutions, and (17) Partnerships for the Goals.

Among these, Sustainable Development Goal 3, titled “Good Health and Well-being”, plays a particularly critical role. It aims to ensure healthy lives and promote well-being for all individuals at every stage of life. SDG 3 is not only a standalone objective but also a foundational pillar for the achievement of many other goals, as physical and mental health are deeply interconnected with education outcomes, workforce productivity, economic development, and social stability.

Education, particularly through the lens of Education for Sustainable Development (ESD), supports SDG 3 by cultivating health literacy, promoting well-being, and fostering lifelong health-conscious behaviours. In this regard, physical education has emerged as a key enabler of SDG 3, despite often being underrepresented in sustainability discourse. It directly contributes to enhancing physical and mental health, preventing lifestyle-related diseases, promoting inclusive participation, and encouraging habits conducive to long-term well-being.

UNESCO (2015) emphasizes the value of sport and physical activity by conceptualising them as both means of achieving and indicators of sustainable development. This dual function highlights their capacity to connect different generations, reduce regional inequality, and provide fair access to health-promoting opportunities. As such, integrating physical education into the sustainable development framework is essential to advancing broader educational and societal goals at both national and local levels.

China has shown strong alignment with the 2030 Agenda through policies such as the “Healthy China 2030” strategy and the “14th Five-Year Plan for Sports Development” (Xinhua News Agency, 2016; 2021). These national initiatives place physical education at the centre of efforts to improve public health, enhance the quality of education, and promote sustainable development. At the provincial level, Shaanxi has issued its own policy directive, titled Implementation Opinions on Accelerating the Construction of a Strong Sports Province (2020), which encourages

better integration between health and education systems, equitable distribution of resources, and improved quality across all types of educational institutions.

Despite these positive policy directions, the implementation of sustainable physical education practices in private colleges within Shaanxi Province remains inconsistent and limited. These institutions, which serve a substantial number of students, often encounter systemic challenges such as inadequate funding, insufficient professional development for teaching staff, poor-quality facilities, and a lack of comprehensive policy support. These limitations are further compounded by societal perceptions that place greater value on academic subjects than on physical education, particularly in educational environments that emphasise academic competition. As a result, physical education in private colleges typically receives minimal curricular focus, limited strategic investment, and little innovation in instructional approaches or assessment methods.

Empirical research has highlighted a range of teaching and institutional issues that hinder the development of sustainable physical education. Lohmann et al. (2021) found that many physical education instructors work without a well-defined pedagogical framework based on sustainability principles, often relying on outdated methods that do not meet the needs of today's students. Zhang (2020) observed that current approaches to physical education in public institutions fail to promote the concept of lifelong physical activity, which leads to lower levels of student engagement and reduced motivation to pursue long-term health-related behaviours. Baena-Morales et al. (2022) reported that physical education teachers lacked practical guidelines for integrating Education for Sustainable Development into their lessons, resulting in fragmented and inconsistent practices that fail to deliver broad impact.

Feng (2021) identified a decline in students' enthusiasm for physical education classes, accompanied by rising levels of stress, disinterest, and emotional disengagement. These trends reflect wider weaknesses in curriculum design and institutional support. Additionally, He, Huang, and Ye (2021) pointed out that cultural norms and family expectations often discourage participation in sport, especially in

schools that are not academically elite. There remains a widespread belief that time spent on physical activity detracts from academic success, which has contributed to long-term underinvestment in school-based sports programmes.

Administrative problems also pose significant obstacles to progress. He and Zhang (2016) noted that sports resources are frequently mismanaged in colleges, leading to underused facilities and unnecessary duplication of activities. Li (2019) highlighted challenges in delivering extracurricular sports programmes in universities, many of which suffer from financial and organisational constraints. These issues are especially apparent in private institutions, which often lack structured systems for curriculum improvement, teacher evaluation, and long-term strategic planning.

The challenges facing private colleges in Shaanxi Province are of particular concern given the region's focus on strengthening both education and athletic development. Public universities typically benefit from direct government policy and financial support, whereas private colleges operate in less centralised and less stable systems. This creates unequal learning opportunities and exacerbates regional differences in educational outcomes and health standards. Despite their vital contribution to meeting the growing demand for higher education and offering diverse learning options, private colleges have seldom been the focus of specific research or targeted policies in relation to physical education.

This situation reveals a critical research gap in understanding how the principles of Education for Sustainable Development, particularly those supporting SDG 3, can be effectively applied to physical education teaching in private colleges. Bridging this gap requires comprehensive investigation across several key areas, including curriculum development, instructional practices, teacher qualifications, institutional leadership, and prevailing cultural attitudes. Conducting such research is both timely and essential to inform evidence-based solutions that can foster long-term equity in education and sustainability in health outcomes.

Therefore, this study aims to undertake an in-depth empirical analysis of the current state of physical education teaching in private colleges in Shaanxi Province. The research will evaluate the extent to which teaching practices align with

sustainability principles, identify institutional and pedagogical barriers, and propose practical strategies for improvement. In doing so, this study seeks to develop a contextually appropriate and integrated strategy for sustainable physical education that aligns with both national policy priorities and the global goals of sustainable development. Its findings are expected to contribute meaningfully to the creation of a more equitable, healthier, and sustainable future for all.

Research Questions

1. What are the current and expected situations of sustainable development of physical education teaching in private colleges in Shaanxi Province?

2. What are the strategies for influencing the sustainable development of physical education teaching in private colleges in Shaanxi Province?

3. Is the sustainable development strategy of physical education teaching in private colleges in Shaanxi Province suitable and feasible?

Objectives

1. To study the current and expected situation of sustainable development of physical education teaching in private colleges in Shaanxi Province.

2. To develop strategies to influence the sustainable development of physical education teaching in private colleges in Shaanxi Province.

3. To evaluate the feasibility and adaptability of strategy for the sustainable development of physical education teaching in private colleges in Shaanxi Province.

Scope of the Research

Population and the Sample Group

Objectives 1: To study the current and expected situation of sustainable development of physical education teaching in private colleges in Shaanxi Province.

Population:

A total of 900 physical education teachers and sports administrators from 32 private colleges in Shaanxi Province. (data from Shaanxi Provincial bureau of statistics)

The Sample Group:

This study will select representative institutions from various regions of Shaanxi, with a focus on private institutions. A stratified sampling method was used to select physical education teachers and sports administrators from 8 private colleges in Shaanxi Province. A total of 200 physical education teachers and sports administrators from these eight private colleges were surveyed using a cluster sampling method.

Sampling Method

This study employed multi-stage random sampling conducted in two stages:

1. Selection of Schools

In the first stage, 25% of the schools were selected from a total of 32 schools, resulting in 8 schools. The selection was conducted using simple random sampling through a lottery method to ensure that each school had an equal chance of being chosen.

2. Selection of Teachers

In the second stage, a total of 163 teachers were selected from the 8 sampled schools. The sampling was carried out using stratified random sampling, ensuring that the number of teachers chosen from each school was proportional to the total number of teachers in that school. This method guaranteed representation from all strata and preserved proportionality in the sample.

Objective 2: To develop strategies to influence the sustainable development of physical education teaching in private colleges in Shaanxi Province.

Target Group:

A purposive sampling method was employed to select a total of 11 experts in sports education from eight universities. This group comprised six physical education teachers, two sports management personnel, and three experts from the sports industry.

The selection criteria for physical education teachers and sports management personnel were as follows:

1) Possession of a master's degree or higher;

2) A minimum of five years of work experience at their respective institutions;

3) Holding a senior professional title and having a strong foundation in educational theory; and

4) Familiarity with institutional development planning, physical education administration, and student development processes.

Additionally, three experts from the sports industry were invited to participate due to their recognised influence in strategic planning for physical education in private universities, sustainable sports development, and the promotion of students' learning abilities. The criteria for selecting these industry experts included:

(1) at least 15 years of professional experience in the relevant field;

(2) holding a senior professional title; and

(3) having held a senior leadership position.

Objectives 3: To evaluate the feasibility and adaptability of strategy for the sustainable development of physical education teaching in private colleges in Shaanxi Province

The Target Group:

Five experts were invited to evaluate the sustainable development strategy for physical education teaching. These experts were affiliated with Shaanxi International Business and Trade College and Xi’an Peihua College. They were selected based on their recognised expertise and influence in the formulation of sustainable development strategies, talent cultivation, and educational management within the context of physical education in private higher education institutions.

The qualifications required for expert selection were as follows:

(1) a minimum of 15 years of professional experience in the field;

(2) possession of a senior professional title; and

(3) experience in holding a senior leadership position.

The Variable

Independent Vaiable:

Strategic factors affecting sustainable physical education teaching:

1. Policy and Governance
2. Curriculum Design and Innovation
3. Faculty Development and Professional Training
4. Student Engagement and Lifelong Learning
5. Financial Sustainability and Resource Allocation
6. Infrastructure and Technology Integration
7. Community Collaboration and Industry Partnerships

Dependent Variable:

Strategy for the sustainable development of physical education teaching

Contents

This study investigates the current status of sustainable development in physical education at private universities in Shaanxi Province. It formulates strategies to enhance this development, evaluates the effectiveness of the proposed strategies, and outlines appropriate countermeasures and implementation methods.

Timeline

The research was conducted primarily between September 2024 and August 2025, and comprised the following key phases:

In September 2024, the writing and review of the first three chapters were completed, and the proposal defence was successfully passed.

From October 2024 to February 2025, questionnaire surveys and literature reviews were conducted to examine the current situation and identify existing challenges related to sustainable development in physical education teaching, both domestically and internationally, in private colleges and universities.

Between March and May 2025, strategies were developed to strengthen the capacity for sustainable development in physical education teaching. Experts were invited to assess the adaptability and feasibility of these strategies.

The research findings were summarised, the final thesis was completed, and the paper was published in October 2025.

Advantages

This research is expected to yield practical and strategic value for various stakeholders engaged in the planning, implementation, and evaluation of physical education in private colleges. The intended users and applications are as follows:

1. Educational Administrators and Policy Makers

1.1 The findings will offer empirical evidence and strategic guidance for formulating and implementing sustainable education policies, with a focus on physical education in private higher education.

1.2 Provincial authorities, such as the Shaanxi Department of Education and the General Administration of Sport, can apply the results to develop region-specific strategies for health promotion, aligning with national education and development priorities.

2. Private Colleges and Universities

2.1 Institutional leaders and academic planners can utilise the strategic recommendations to revise and improve physical education curricula, allocate resources more effectively, and enhance long-term programme sustainability.

2.2 The study provides a framework for institutional self-assessment and continuous improvement in the quality of physical education provision.

3. Physical Education Teachers and Faculty Members

3.1 The findings can inform teacher training and professional development by identifying the competencies and pedagogical approaches needed to deliver sustainable physical education.

3.2 Educators may also adopt the proposed strategies to improve instructional design, increase student motivation, and cultivate lifelong physical literacy.

4. Students in Private Colleges

Students will benefit from improved physical education systems through enhanced physical and mental well-being, greater opportunities for teamwork and leadership development, and support for holistic personal growth.

5. Researchers and the Academic Community

5.1 The study contributes to the academic discourse on sustainable education practices, particularly within the context of private higher education in China.

5.2 It may serve as a foundation for future research related to educational development, public health, and innovation in education policy.

Definition of Terms

Private colleges and universities refer to non-state educational institutions established by enterprises, social organisations, and individual citizens using non-governmental funding sources. These institutions operate independently of the state fiscal education system and are open to the general public.

They include various levels of higher education, such as junior colleges, undergraduate institutions, and postgraduate schools. This category also encompasses independent private colleges and universities, as well as independent colleges affiliated with public universities.

Physical education refers to a structured academic discipline that provides systematic learning experiences aimed at developing students' physical competence, health-related knowledge, social interaction, and emotional well-being through physical movement, sport, and exercise. It extends beyond recreational activity to encompass cognitive development, motor skills acquisition, and value formation, with the goal of fostering lifelong engagement in physical activity and promoting holistic personal development and social inclusion.

Sustainable development refers to a holistic and long-term development model that aims to meet the needs of the present without compromising the ability of future generations to meet theirs. It involves the balanced and coordinated

promotion of economic growth, environmental protection, and social equity through responsible resource management, pollution reduction, ecosystem preservation, and the advancement of inclusive and equitable progress. This concept, first introduced in the 1987 Brundtland Report, serves as a guiding framework for sustainable policy, education, and institutional practice globally.

Strategy refers to a structured and goal-oriented plan comprising a series of long-term decisions and coordinated actions aimed at achieving specific objectives within defined resource and environmental constraints. It involves situational analysis, goal setting, programme selection, and resource allocation. A sustainable development strategy, in particular, seeks to integrate economic, social, and environmental priorities to ensure present and future well-being.

Policy and Governance refer to the provision of institutional assurance and operational support for the sustainable development of physical education through the establishment of a scientifically grounded and coherent policy framework, alongside an efficient and standardised governance mechanism. At the policy level, this encompasses guidance and incentive measures introduced by governments and educational authorities in areas such as financial investment, teacher development, curriculum reform, and infrastructure provision. Governance pertains to the organisation and administration of physical education, including institutional arrangements and the development of quality assurance and evaluation systems within higher education institutions.

Curriculum Design and Innovation refers to the systematic planning of objectives, content, instructional methods, and assessment mechanisms for physical education, based on students' physical and psychological developmental needs, institutional orientation, and the evolving societal demand for sports professionals. The curriculum encompasses structured teaching plans, learning activities, content delivery, and evaluation approaches, representing the totality of organised learning experiences provided by the institution.

Faculty Development and Professional Training refer to a systematic, multi-level mechanism aimed at enhancing the professional competence, teaching effectiveness, and developmental capacity of physical education (PE) teachers. This includes not only the advancement of pedagogical skills, but also the strengthening of research capability, curriculum design expertise, interdisciplinary literacy, and proficiency in the application of information technology. Professional training involves targeted initiatives such as continuing education, practical workshops, research engagement, and exchange programmes regularly organised by higher education institutions and relevant authorities. These efforts are intended to equip teachers with up-to-date concepts, methods, and technologies in PE, enabling them to meet the demands of modern, diversified, and student-centred education.

Student Engagement and Lifelong Learning refer to the development of a student-centred teaching system designed to foster learners' initiative, enthusiasm, and sustained interest in physical education. This approach aims to cultivate students' awareness and ability to internalise physical activity as an integral part of their lifestyle, thereby promoting the lifelong development of physical literacy.

Financial Sustainability and Resource Allocation refer to the capacity of colleges and universities to maintain long-term and stable investment in physical education without reliance on short-term financial subsidies or temporary funding sources. This involves the scientific planning and rational utilisation of teaching resources, including funding, personnel and facilities, within conditions of limited availability. The aim is to enhance the efficiency of resource use and ensure the delivery of high-quality physical education outcomes.

Infrastructure and Technology Integration refers to the coordinated use of physical facilities, including sports venues, equipment and instructional spaces, together with modern information technologies such as smart sports platforms, teaching management systems and data analysis tools. This integration aims to enhance the efficiency of physical education teaching and increase student engagement

Community Collaboration and Industry Partnerships refer to the process of establishing diverse cooperation mechanisms with community organisations, sports institutions, enterprises and related industries within the region where colleges and universities are located. This collaboration involves the integration of external resources to jointly advance the alignment of physical education with social services and local economic development.

Research Framework

This research framework systematically illustrates the process of developing a sustainable strategy for physical education (PE) teaching in private colleges in Shaanxi Province.

First, a literature review is conducted to examine sustainable education, physical education, private colleges, sustainable development strategies for PE teaching, key influencing factors, the current status of strategic planning and management, SWOT analysis and TOWS matrix, as well as relevant studies.

Second, based on seven dimensions-policy and governance, curriculum design and innovation, faculty development and professional training, student engagement and lifelong learning, financial sustainability and resource allocation, infrastructure and technology integration, and community collaboration and industry partnerships-the current and expected situations of sustainable PE teaching are investigated and analyzed. Both quantitative and qualitative data are integrated to calculate the Modified Priority Needs Index (PNIModified).

On this basis, strategies are developed using SWOT analysis, the TOWS matrix, and focus group discussions, resulting in a comprehensive plan that incorporates the vision, seven missions, goals, and strategies, further detailed into 31 activities and 31 corresponding Key Performance Indicators (KPIs).

Finally, the feasibility and adaptability of the strategy are evaluated by five experts, thereby establishing a systematic strategic framework for the sustainable development of PE teaching in private colleges in Shaanxi Province.

The research framework for the study on the development of a sustainable strategy for physical education teaching in private colleges in Shaanxi Province is presented in Figure 1.

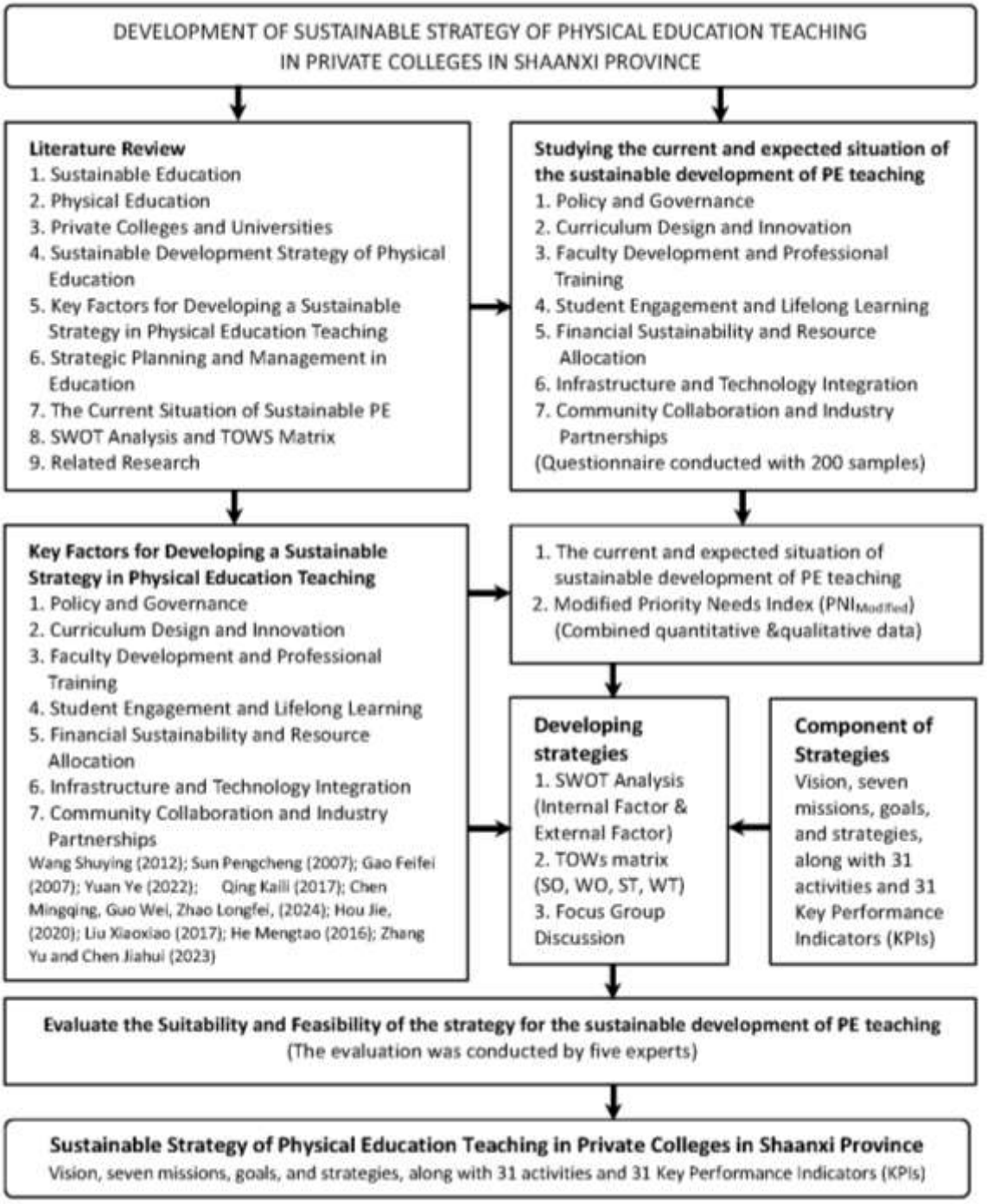

Figure 1.1 Research Framework

Chapter 2

Literature Review

The research titled Development of a Sustainable Strategy for Physical Education Teaching in Private Colleges in Shaanxi Province involved a comprehensive review of relevant concepts, theories, and related studies to serve as a foundation and guideline for the investigation, as outlined below.

1. Concept of Sustainable Education
2. Concept of Physical Education
3. Concept of Private Colleges and Universities
4. Concept of Sustainable Development Strategy of Physical Education
5. Concept of Key Factors for Developing a Sustainable Strategy in Physical Education Teaching
6. The Theory of Strategic Planning and Management in Education
7. Concept of The Current Situation of Sustainable Physical Education
8. The Theory of SWOT Analysis and TOWS Matrix
9. Summary and Implications for the Present Study
10. Summary of the Conceptual and Research Framework
11. Related Research

Concept of Sustainable Education

In response to mounting global challenges such as climate change, inequality, and health disparities, the concept of sustainable education has emerged as a critical pillar of long-term development. Sustainable education emphasises not only the acquisition of knowledge but also the cultivation of values, skills, and behaviours that empower learners to contribute to a more equitable, inclusive, and environmentally responsible future. This section explores the core principles and

frameworks underpinning sustainable education, with particular reference to its role within the broader agenda of Education for Sustainable Development (ESD).

1. Definition and Scope of Sustainable Development

The concept of sustainable development has become a guiding principle for global education, policy, and governance. It first gained prominence through the Brundtland Commission's report Our Common Future, which defines sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development [WCED], 1987). This widely accepted definition underscores the importance of balancing environmental protection, economic growth, and social inclusion. Expanding upon this, the United Nations Educational, Scientific and Cultural Organization (UNESCO, 2015) describes sustainable development as a holistic approach that aims to improve the quality of life for all, while safeguarding the planet's ecological balance. Similarly, the Organisation for Economic Co-operation and Development (OECD, 2001) frames sustainable development as the ability of a society to manage its resources and social systems in a way that ensures long-term prosperity and resilience.

Within the educational context, Education for Sustainable Development (ESD) has emerged as a critical strategy for promoting sustainable values and behaviours among learners of all ages. According to Lélé (1991), sustainable education involves integrating awareness of environmental, social, and economic challenges into the education system, with the goal of empowering individuals to make responsible and informed decisions. Bonnett (1999) highlights the importance of ESD in higher education, referring to it as Higher Education for Sustainable Development (HESD), and argues that universities serve as critical platforms for sustainability innovation and leadership. Furthermore, Mohanty and Dash (2018) define sustainable education as a renewable resource that enables learners to adapt to the demands of the twenty-first century, including sustainability in personal lifestyles, community development, and professional environments.

In summary, in this study refers to a holistic and long-term development model that aims to meet the needs of the present without compromising the ability of future generations to meet theirs. It involves the balanced and coordinated promotion of economic growth, environmental protection, and social equity through responsible resource management, pollution reduction, ecosystem preservation, and the advancement of inclusive and equitable progress. This concept, first introduced in the 1987 Brundtland Report, serves as a guiding framework for sustainable policy, education, and institutional practice globally. Sustainable development encompasses a multidimensional and people-centred vision for human advancement, focusing on the integration of ecological, social, and economic considerations. Education for Sustainable Development (ESD) serves as the pedagogical foundation for equipping learners with the skills, values, and attitudes necessary to engage with sustainability challenges in a critical and constructive manner. By embedding sustainability principles in the curriculum and fostering reflective and participatory learning environments, ESD contributes not only to individual growth but also to collective transformation in pursuit of a more sustainable and just global society.

2. Education for Sustainable Development (ESD) Framework and Principles

Education for Sustainable Development (ESD) has become a critical framework for incorporating sustainability throughout educational systems. ESD is defined by UNESCO as an educational approach that equips learners with the knowledge, skills, values, and attitudes required to contribute responsibly to economic viability, environmental integrity, and social equity (UNESCO, 2015). The foundation of ESD includes eight core competencies such as systems thinking, critical analysis, and anticipatory action. These competencies enable individuals to effectively navigate complex global challenges related to sustainability (Rieckmann, 2018). The United Nations Sustainable Development Goals (SDGs), particularly Target 4.7 under SDG 4, highlight the importance of integrating ESD into all levels of education in order to foster global citizenship and sustainable practices (United Nations, 2015).

Developing Perspectives: In the context of national application, Chinese scholars have contributed significantly to the adaptation of ESD frameworks. Xu Li (2017) proposed a theoretical model based on complex adaptive systems to support sustainable transformation in education. Her work underscores the importance of flexibility, ecological sensitivity, and lifelong learning in shaping educational reform. Meanwhile, Wang Yongsheng (2015) argued for the integration of sustainable development content across subject areas, recommending the development of school-based curricula and community engagement initiatives. His research also acknowledged challenges such as unclear policy guidance, limited resources, and the need for professional development among educators and administrators. These perspectives are particularly valuable in the context of private higher education institutions, where autonomy and innovative capacity may facilitate the implementation of sustainable strategies.

In summary, Education for Sustainable Development offers a strategic and multidimensional framework for aligning education with long-term sustainability goals. Internationally endorsed models such as those promoted by UNESCO provide robust guidance for curricular and institutional reform, while domestic research adds critical insights tailored to the national context. Within this framework, ESD supports the development of strategic initiatives in physical education that align with broader goals of sustainable human development, environmental stewardship, and social well-being, particularly within the evolving landscape of private colleges in China.

3. The Role of Education in Achieving the UN Sustainable Development Goals (SDGs)

Education plays a fundamental role in the global pursuit of the United Nations Sustainable Development Goals (SDGs), functioning not only as a stand-alone goal (SDG 4) but also as a key enabler for the achievement of all other goals. Adopted in 2015 as part of the 2030 Agenda for Sustainable Development, the SDGs provide a universal framework to address poverty, environmental degradation, inequality, and promote prosperity and peace worldwide (United Nations, 2015). SDG 4 specifically calls for inclusive, equitable, and quality education and the

promotion of lifelong learning opportunities for all. Within this goal, Target 4.7 highlights the integration of Education for Sustainable Development (ESD), global citizenship, and sustainable lifestyles into all levels of education as a means to foster transformation across societies. Education is widely recognised as a cornerstone of human development, instrumental in addressing interconnected global challenges such as poverty, climate change, and public health.

The SDGs encompass 17 integrated goals, each addressing a distinct but interconnected dimension of sustainable development. These include eradicating poverty (SDG 1), achieving zero hunger (SDG 2), ensuring healthy lives (SDG 3), promoting gender equality (SDG 5), addressing climate change (SDG 13), and fostering peace, justice, and strong institutions (SDG 16), among others. Of particular relevance to this study is SDG 3, which focuses on good health and well-being. Quality physical education programmes contribute significantly to this goal by promoting healthy behaviours, physical fitness, and mental well-being among learners (World Health Organization [WHO], 2020). Additionally, SDG 10 (Reduced Inequalities) and SDG 5 (Gender Equality) are reinforced through inclusive physical education policies that cater to diverse student needs. SDG 17, which emphasises partnerships for the goals, aligns directly with the need for collaboration among educational institutions, government agencies, and international organisations in promoting sustainable physical education and broader education reforms. As Leicht et al. (2018) emphasise, global cooperation, policy coherence, and knowledge exchange are essential to scaling up ESD efforts across all sectors.

In conclusion, the transformative potential of education is central to the SDG agenda. Through thoughtful curricular design, policy development, and participatory pedagogies, and participatory pedagogies, education in the field of physical education in particular, can empower learners with the competencies needed for sustainable living and societal resilience. For private colleges in Shaanxi Province, aligning educational strategies with the SDGs, especially SDGs 3, 4, and 17, offers a strategic opportunity to contribute to both national development goals and the broader international framework for sustainable development. By fostering collaboration and

embedding sustainability into physical education, these institutions play a pivotal role in shaping future-ready citizens and achieving enduring, equitable change by 2030.

4. Integration of Sustainability into Curricula and Teacher Training

Educational reform aimed at sustainability necessitates not only curriculum redesign but also comprehensive teacher training. Integrating sustainability into curricula requires embedding environmental, social, and economic dimensions across subject areas and ensuring that educators are prepared to facilitate this integration effectively. For instance, Eliyawati et al. (2023) demonstrated that teacher training programmes that focus solely on ecological content fall short of cultivating sustainable awareness and action. Instead, training must also develop educators' value systems and agency for sustainability.

In higher education settings, Ukamaka (2023) advocates for cross-curricular integration of Education for Sustainable Development (ESD), with strategies such as project-based learning, interdisciplinary modules, and community partnerships proving effective. The integration should be systemic and incorporated across teaching methodologies, student assessment, and institutional culture to foster sustainability competencies in learners. Abo-Khalil (2022) confirmed that universities which align sustainability with all academic and extracurricular dimensions are better positioned to produce graduates attuned to global sustainability challenges and ready for societal leadership.

In the context of physical education teaching in private colleges in Shaanxi Province, these insights are highly applicable. Implementing a sustainable strategy will require curricula that interweave sustainability themes such as health, environment, and equity into physical education content, alongside teacher training that equips instructors with pedagogical tools to deliver such content. By structuring in-service and pre-service training programmes around holistic sustainability concepts, institutions can empower physical education teachers to foster student competencies aligned with SDG 3 (Good Health and Well-being), SDG 4 (Quality Education), and the broader sustainability agenda. This alignment forms a core

element of the sustainable strategy essential to achieving long-term outcomes in both educational and public health domains.

5. Global Trends and Best Practices in Sustainable Education

In recent decades, global education systems have undergone a transformative shift in response to the pressing need for sustainability. Education for Sustainable Development (ESD) has become a pivotal framework within international agendas, particularly under the United Nations 2030 Agenda for Sustainable Development. Institutions worldwide are integrating sustainability not only into curricula, but also into governance, operational procedures, and community outreach. The League of European Research Universities (LERU, 2024) highlights that leading universities now embed ESD within their strategic plans, reflecting a commitment to holistic institutional transformation. Similarly, UNESCO's Global Action Programme on ESD promotes peer learning, policy innovation, and inter-sectoral collaboration to embed sustainable development across all levels of education (UNESCO, 2023). These movements indicate that sustainable education is increasingly viewed as a comprehensive institutional ethos rather than a discrete academic subject.

International best practices demonstrate a variety of innovative approaches that could inform policy and pedagogy in developing regions. For example, initiatives such as AASHE's STARS reporting system and Green Office Models at institutions across Europe offer replicable frameworks for accountability and campus-wide sustainability engagement (AASHE, 2011; LERU, 2024). Pedagogically, methods such as problem-based learning, immersive environmental simulations, and interdisciplinary curricula have proven effective in fostering sustainability competencies (Eliyawati et al., 2023; Leal Filho et al., 2018). Importantly, such practices emphasise student agency and institutional collaboration, both of which are essential for building sustainable, resilient education systems. In China, leading public universities such as Tsinghua and Fudan have implemented green campus initiatives and launched interdisciplinary programmes focusing on sustainability (Zhang, 2020). However, private colleges still face challenges including resource constraints, limited access to sustainability networks, and insufficient policy support (Chen & Liu, 2021).

In the context of physical education in private colleges in Shaanxi Province, aligning institutional strategy with global trends in sustainable education can provide both direction and inspiration. The incorporation of project-based and experiential learning activities within physical education courses can contribute directly to Sustainable Development Goals, particularly SDG 3 (Good Health and Well-being), SDG 4 (Quality Education), and SDG 17 (Partnerships for the Goals). Establishing cross-sectoral partnerships between educational institutions, local governments, and health-focused NGOs can facilitate the design of sustainable and health-oriented physical education programmes. By drawing upon global models and best practices while contextualising them within local needs, private colleges in Shaanxi can play a meaningful role in advancing sustainable development through inclusive and innovative physical education strategies.

Concept of Physical education

Physical education (PE) plays a vital role in fostering the holistic development of individuals by promoting physical health, mental well-being, and social skills. Traditionally integrated into educational systems as a means to improve students' physical fitness and instil discipline, PE has evolved to encompass broader educational objectives aligned with lifelong wellness and active citizenship. As global health challenges intensify and sedentary lifestyles become increasingly common, physical education has gained renewed significance in preparing young people to adopt healthy behaviours and contribute to sustainable societies.

1. Definitions and Aims of Physical Education

Physical education (PE) is widely acknowledged as a foundational academic discipline across education systems worldwide. It delivers structured learning experiences centred on physical competence, health knowledge, and social skills through movement and sport (Kirk, 2012; Siedentop et al., 1996). Rather than simply promoting recreational activities, PE emphasises both the concepts of education and learning. It encourages students to develop motor skills, cognitive understanding, emotional resilience, and an appreciation for diverse movement cultures (Young,

2014). The overarching aim of physical education is to equip learners with the knowledge, abilities, and attitudes necessary for maintaining lifelong physical activity, improving personal well-being, and contributing to social inclusion.

From the above it can be concluded that Physical education refers to a structured academic discipline that provides systematic learning experiences aimed at developing students' physical competence, health-related knowledge, social interaction, and emotional well-being through physical movement, sport, and exercise. It extends beyond recreational activity to encompass cognitive development, motor skills acquisition, and value formation, with the goal of fostering lifelong engagement in physical activity and promoting holistic personal development and social inclusion.

In recent years, PE has increasingly been conceptualised in relation to sustainable human development. Programmes designed around physical education offer opportunities to incorporate environmental awareness, health promotion, and social equity. These aspects correspond directly with the core objectives of the Sustainable Development Goals (SDGs), particularly SDG 3 (Good Health and Well-being), SDG 4 (Quality Education), and SDG 10 (Reduced Inequalities) (Froberg & Lundvall, 2022; Delgado-Montoro et al., 2022). Systematic reviews emphasise the importance of developing wider competencies such as physical literacy, mindfulness, and environmental awareness through PE curricula. These approaches enable physical education to serve not only as an academic subject but also as a vehicle for lifelong learning and societal advancement.

Relevance to Shaanxi Private Colleges: For private colleges in Shaanxi Province aiming to develop a sustainable strategy for PE teaching, these definitions and educational objectives provide a robust theoretical foundation. When instructional design incorporates holistic goals-such as enhancing physical literacy, promoting inclusivity, and fostering environmental responsibility-institutions are better positioned to support both student well-being and community development. Pedagogical planning and teacher training should align with these broader aims, ensuring consistency with public health policies, institutional strategies, and global

education agendas. This alignment is central to the formulation of a practical, evidence-based model for physical education in the context of private higher education.

2. Physical Literacy and Lifelong Physical Activity

Physical literacy is increasingly recognised as a foundational concept for promoting lifelong engagement in physical activity and improving public health. The International Physical Literacy Association defines it as “the motivation, confidence, physical competence, knowledge and understanding to value and take responsibility for engagement in physical activities for life” (IPLA, 2022, as cited in Butler, 2025). This concept encompasses affective, physical, cognitive, and behavioural domains, forming a holistic approach to movement and well-being (Whitehead, 2010; Turn0search3). Empirical studies have linked higher levels of physical literacy with better aerobic fitness, body composition, and sustained physical activity participation across the lifespan (Turn0search2; Turn0search31).

In relation to sustainable physical education, developing physical literacy is essential for ensuring that students build active lifestyles that persist beyond formal schooling. As outlined by Dudley and Cairney (2020), physical literacy enriches PE programmes by emphasising competencies rather than only performance outcomes. Interventions such as teaching games for understanding (Mandigo et al., 2019) have significantly improved students’ physical literacy and intrinsic motivation (Turn0search0). Moreover, systematic reviews underscore that physical literacy interventions promote long-term physical well-being and enhance readiness to embrace health-oriented lifestyle choices (Turn0search15). These findings suggest that embedding physical literacy into PE curricula can align educational objectives with broader Sustainable Development Goals, particularly SDG 3 (Good Health and Well-being) and SDG 4 (Quality Education).

In the context of Shaanxi’s private colleges, a sustainable strategy for physical education teaching should prioritise physical literacy development as a core educational aim. Curriculum design that integrates learner-centred, movement-based pedagogies can support students in gaining competence and confidence, thereby

boosting participation rates and long-term health outcomes. Teacher training should equip instructors with the skills to deliver PL-centred instruction, adapt assessment methods, and foster inclusive, motivational environments. Incorporating community and cultural dimensions within PE, including local sports practices, can further enhance relevance and ownership. Together, these measures can support the sustainable transformation of physical education programmes, aligning institutional policy, pedagogical practice, and strategic outcomes.

3. The Role of Physical Education in Holistic Student Development

Physical Education (PE) is widely recognised as a critical Factor in promoting holistic student development, supporting not only physical health but also emotional, social, and cognitive growth. Through structured physical activities, PE enables students to enhance their motor skills, develop positive self-esteem, and build resilience in the face of challenges (Hulteen et al., 2022; López-Flores et al., 2023). Recent empirical studies affirm that consistent participation in physical education is positively associated with improved academic engagement, emotional regulation, and the formation of interpersonal competencies necessary for lifelong success (Fernández-Bustos et al., 2021).

Integrating holistic developmental goals within physical education aligns closely with the objectives of sustainable education. For example, Rodríguez-Bravo et al. (2020) highlight that PE curricula which incorporate teamwork, self-directed learning, and reflective practice can nurture personal responsibility and leadership in students. Moreover, educators trained in modern pedagogical frameworks are more capable of designing inclusive, student-centred activities that address the social and emotional needs of diverse learners (Amoedo et al., 2023). These insights support a shift towards PE models that go beyond physical conditioning to intentionally foster socio-emotional development and sustainability-oriented mindsets.

In the context of this research, developing a sustainable strategy for physical education teaching in private colleges in Shaanxi Province requires an integrated approach that prioritises holistic student outcomes. PE should be embedded as a transformative learning experience that builds physical competence alongside

emotional intelligence and civic awareness. Teacher preparation must include training in interdisciplinary and values-based instruction that reflects both national goals, such as the “Health First” initiative, and global frameworks like the Sustainable Development Goals (particularly SDG 3: Good Health and Well-being). Such alignment will help ensure that physical education contributes meaningfully to sustainable human development in higher education institutions.

4. Characteristics of Physical Education in Private Colleges

Private colleges in China have become increasingly significant within the landscape of higher education, offering diverse academic programmes and accommodating a growing student population. However, the development of Physical Education (PE) in these institutions faces unique challenges. Unlike their public counterparts, private colleges often struggle with limited funding, inadequate facilities, and a shortage of qualified PE instructors. These constraints collectively hinder the effective delivery of PE programmes and impact students' physical well-being and engagement in sports activities (Zhang, 2020).

The challenges encountered by PE programmes in private colleges are multifaceted. Financial constraints often result in outdated or insufficient sports facilities, limiting the ability to offer a comprehensive curriculum (Zhang, 2020). Furthermore, the scarcity of qualified PE teachers, combined with limited professional development opportunities, contributes to a workforce that may lack the skills and motivation required for effective instruction (Clausius Press, 2023). The institutional focus on academic achievements over physical education also contributes to the marginalisation of PE, leading to lower student participation and enthusiasm. This is compounded by limited awareness among both students and administrators about the role of PE in fostering holistic development (Clausius Press, 2023).

In summary, while private colleges serve a vital role in expanding access to higher education in China, their PE programmes face substantial limitations that undermine their effectiveness. Overcoming these challenges necessitates increased investment in sports infrastructure, the recruitment and training of qualified

instructors, and a shift in institutional culture that recognises the importance of PE for comprehensive student development. By adopting such strategies, private institutions can enhance PE delivery and contribute meaningfully to students' well-being and national education goals.

5. Trends, Challenges, and Reform in Tertiary PE Teaching

Tertiary PE teaching is undergoing significant transformation globally, driven by evolving educational paradigms, technological innovations, and increased recognition of holistic student development. In China, the "Health First" policy highlights the need to integrate physical well-being into the broader education framework, leading to reforms that focus on physical fitness, mental health, and social adaptability (Zhou & Liu, 2020). Internationally, there is a move towards competency-based education, with PE curricula designed to develop physical literacy, critical thinking, and lifelong physical activity (OECD, 2019).

Despite these trends, tertiary PE teaching continues to face challenges. In China, discrepancies in resource allocation between urban and rural institutions hinder consistent implementation of PE reforms (Yang, 2024). The prioritisation of academic subjects often results in insufficient class time and underqualified instructors (Ministry of Education [MOE], 2021). Internationally, PE faces barriers such as ineffective technology integration, diverse student needs, and a lack of alignment between teaching and competency-based assessment (OECD, 2019). Moreover, the COVID-19 pandemic highlighted the necessity of flexible, resilient models for delivering PE in both physical and digital formats (UNESCO, 2020).

In conclusion, tertiary PE teaching is evolving to address contemporary educational needs but must overcome structural, pedagogical, and policy challenges. In China, it is crucial to improve resource distribution, upgrade teacher training, and raise the academic status of PE. Globally, the effective use of technology, inclusive practices, and robust assessment systems are essential. If addressed, these factors can transform PE into a core element of higher education that supports lifelong physical and mental well-being.

6. Comparative Overview: Private vs Public PE Programmes

Within China's higher education sector, both public and private institutions are central to delivering PE programmes. Public universities, supported by extensive government funding, usually benefit from superior infrastructure, standardised curricula, and strong alignment with national sports and health policies. In contrast, private colleges, while enhancing diversity and accessibility in higher education, often encounter issues such as limited resources, non-standardised curricula, and reduced state support, which can undermine the quality and consistency of PE provision (He & Zhang, 2016).

Public institutions enjoy comprehensive systems, including high-quality facilities, access to trained instructors, and integration with national health campaigns. These advantages enable them to implement strong PE programmes that advance both physical and moral education (Zhou & Liu, 2020). By contrast, private colleges may offer curricular flexibility and innovative teaching methods, but such autonomy can lead to inconsistent standards and weak policy alignment (Feng, 2023). Furthermore, disparities in funding between sectors result in unequal opportunities for students to engage in meaningful PE experiences (Liu, 2023).

To conclude, although public universities generally provide more structured and well-funded PE programmes, private colleges offer adaptable approaches that can meet diverse student needs. Bridging the gap between these two sectors will require targeted policy interventions, including increased investment, development of standardized yet flexible curricula, and stronger public-private cooperation. Such strategies can help ensure that all students benefit from high-quality PE and achieve holistic development aligned with national priorities.

7. Physical Education in Higher Education Institutions

Physical education: Physical education is jointly participated by teachers and students. Its task is to impart physical knowledge, techniques and skills to students, enhance their physical fitness, and cultivate their morality, will, quality, etc. It is the basic form of school sports and one of the ways to implement sports goals.

Yang Guangyou and Li Shuping (1996) pointed out that school physical education is responsible for cultivating talents with ideals, morality, culture and discipline in the new era. It is achieved through physical education classes, but in physical education classroom teaching, it is a bilateral teaching activity process between teachers and students.

Wang Feng and Duan Lian (1997) pointed out that physical education refers to the basic way to achieve the purpose and tasks of physical education. It is an organized teaching method that guides students to master sports and health care knowledge, basic sports techniques and skills, enhance students' physical fitness, and cultivate lifelong sports ability and good ideological and moral qualities through the joint participation of physical education teachers and students.

Xi Yubao (2001) pointed out that physical education is a kind of sports activity that takes sports knowledge theory, technical methods, skills and techniques as teaching content, and is carried out for mastering sports knowledge, techniques and skills.

Liu Xuming (2019) pointed out that physical education in ordinary universities is a series of physical education and related activities for college students in the environment of higher education, through physical education classes, sports, competitions and other means, with the purpose of helping students acquire sports skills, cultivate the habit of independent physical exercise, and achieve comprehensive physical and mental development.

In summary: school physical education achieves the goal of cultivating talents in the new era through physical education classes, and is a teaching process in which teachers and students participate together. Physical education aims to enable students to master sports knowledge and sports skills, enhance physical fitness, and cultivate lifelong sports ability and good moral character through appropriate methods. College sports help students acquire sports skills and promote comprehensive physical and mental development through courses, sports and competitions. Physical education focuses on imparting sports knowledge, techniques and skills, and is an organized sports activity.

The significance and importance of physical education lies in helping students strengthen their physique, promote physical and mental health, and cultivate sports skills and good living habits through systematic sports activities. It helps relieve stress, improve psychological quality, and enhance self-confidence. In addition, physical education cultivates students' cooperation spirit and social skills through team activities, promotes their all-round development, and ultimately improves the overall quality of life and happiness.

Concept of Private Colleges and Universities

Private colleges and universities represent a vital Factor of the global higher education system, particularly in rapidly developing nations. These institutions have played a significant role in expanding access to tertiary education by offering diverse academic programmes, flexible learning models, and market-oriented curricula. Their emergence reflects broader trends in educational reform and the growing demand for alternatives to public university systems.

1. The Role and Development of Private Colleges and Universities

Private colleges and universities have become integral to the expansion of higher education, particularly in rapidly developing countries such as China. These institutions have grown in number and significance, offering varied academic opportunities and responding to the increasing demand for accessible, market-responsive education. Unlike public universities, private institutions often rely on tuition and private investment, which grants them greater flexibility in curriculum design and institutional governance (Altbach, 2016).

However, the advantages of flexibility and autonomy are counterbalanced by several challenges. These include disparities in public funding, limited infrastructure, and inconsistencies in academic quality and governance. Private colleges also frequently lack access to national research grants, faculty development programmes, and policy influence, making it more difficult to achieve sustainable institutional growth (Feng, 2023). In the context of PE, such limitations can directly affect the development and implementation of quality programmes.

In conclusion, while private higher education institutions play a crucial role in widening access to tertiary education, especially in underserved regions, they face distinct obstacles. Addressing these barriers by means of targeted funding, regulatory support and collaboration with public institutions can enable private colleges to fulfil their potential and deliver educational experiences that meet national and international standards.

2.Theoretical Perspectives on Private Colleges and Universities

The development of private higher education has played an increasingly important role in expanding educational access and diversity globally. In China, this sector began to take shape in the late 1970s and early 1980s alongside the national reform and opening-up policies. The establishment of China Social University in 1982 marked a significant milestone as the first private institution formally recognised in China (Qi, 2022). In 1993, the issuance of the "Outline of China's Education Reform and Development" encouraged civil society to participate legally in running educational institutions, triggering a surge in investment and public interest in private education (Liu, 2020). These developments collectively laid the foundation for the contemporary expansion and institutionalisation of private colleges and universities.

Scholars internationally have analysed the implications of marketisation in higher education. Breneman (1994) noted that the emergence of for-profit institutions in the United States contributed to heightened competition within the sector. Similarly, Newman et al. (2004) and Slaughter and Rhoades (2004) argued that private institutions are both a product of innovation and a vehicle for advancing market-driven reforms in higher education. Within the East and Southeast Asian contexts, Ma (1999) classified private institutions as marginal, supplementary, or dominant based on their role in national educational systems. In China, Sheng (2015) and Tang (2017) emphasised the need for sustainable and balanced growth in private institutions, calling for strengthened governance, clear regulatory frameworks, financial diversification, and improved faculty development. Moreover, recent scholars such as Wang (2022) and Qi (2022) highlighted the importance of internal control, risk management, and alignment with long-term development objectives.

In conclusion, private higher education in China has evolved significantly over the past four decades, shaped by national reforms and global trends in marketisation. While progress has been made, persistent challenges remain in areas such as faculty quality, governance, and sustainability. As such, ongoing research and policy development are essential to optimise the role of private institutions in achieving national education goals. Strengthening regulatory frameworks, improving governance structures, and fostering public-private collaboration are necessary to ensure the long-term, high-quality development of private higher education.

3. Theoretical Perspectives on Private Higher Education in Shaanxi Province

Shaanxi Province has been a pioneer in the development of private higher education in China. The establishment of Xi'an Peihua Women's University in 1984 marked the inception of private college education in the region. Over the subsequent four decades, private higher education in Shaanxi has grown steadily, with 32 institutions now in operation, including 13 private undergraduate colleges, 9 independent colleges, and 10 private junior colleges (Li & Wang, 2020). The provincial government has played an active role in encouraging legal frameworks and governance systems, placing Shaanxi at the forefront of private education policy formulation.

Research by Li (2018) and Li and Wang (2020) has demonstrated that Shaanxi's early start, rapid expansion, and large-scale private sector have made it a strategic focus for educational reform. Scholars advocate that private institutions in Shaanxi should be integrated into the province's broader educational development strategy. This includes enhancing governance structures, innovating in faculty development, improving curriculum quality, and promoting integration with industry and international collaboration. These initiatives align with the national agenda to enhance institutional quality and global competitiveness in higher education (Liu, 2020).

In summary, the theoretical insights into Shaanxi's private higher education sector reflect both its historical significance and future potential. Its successful

trajectory provides a valuable model for other provinces in China, especially regarding legal reforms, governance innovation, and strategic planning. To ensure continued advancement, Shaanxi's private colleges must prioritise institutional transformation, academic quality, and international engagement, thereby contributing to the national goal of building a world-class higher education system.

Concept of Sustainable development strategy of physical education

1. Current Policy and Curriculum Provisions for PE in China

Physical education (PE) has been increasingly recognised in Chinese education policy as a fundamental Factor for fostering national health and student development. The Ministry of Education in China has introduced key reforms, such as the "National Fitness Programme (2021–2025)," which aims to increase students' physical activity levels, promote sports participation, and enhance physical literacy from primary through higher education (Ministry of Education of the PRC, 2021).

Within the framework of higher education, PE has shifted from being a peripheral activity to a compulsory curriculum Factor, particularly following the Health China 2030 strategy. Despite centralised curriculum standards, implementation differs significantly between public and private institutions, where the latter often face challenges in resource allocation, teacher quality, and curricular flexibility (Li & Ma, 2022). Recent studies have highlighted the need to reform PE curriculum to align with sustainable development goals, advocating for inclusion of life-long fitness, mental health, and ecological consciousness (Zhao et al., 2020).

While national policy lays a solid foundation for PE integration, effective curriculum implementation, especially in private colleges, requires ongoing alignment with both governmental priorities and sustainable education strategies. Curriculum development that reflects holistic health, environmental sustainability, and lifelong fitness remains central to achieving high-quality PE education.

2. Implementation of PE Programmes in Private vs. Public Colleges

The implementation of physical education (PE) programmes varies significantly between private and public colleges in China. Public institutions

generally benefit from greater state funding, standardised curricula, and more robust infrastructure, allowing them to provide consistent PE instruction across campuses (Zhao & Hu, 2020). In contrast, private colleges often face financial and policy constraints that limit their capacity to offer high-quality, comprehensive PE programmes. These disparities raise concerns about educational equity and sustainability.

The divergence between private and public colleges also extends to teacher qualifications, class sizes, and extracurricular activities. Research by Liu et al. (2021) highlighted that public colleges were more likely to employ certified PE instructors and offer diverse modules aligned with national health goals, such as the “Health First” initiative. Conversely, private institutions tend to prioritise market-driven courses, often marginalising physical education. This imbalance hampers the sustainable development of PE in private colleges.

In summary, bridging the implementation gap between public and private colleges requires targeted reforms. Policies aimed at resource reallocation, faculty training, and curriculum standardisation can enhance sustainability in PE programmes across all types of institutions. Strengthening government oversight and incentivising private colleges to adopt national PE standards would ensure equitable access to quality physical education for all students (Chen, 2022).

3. Stakeholders’ Perceptions and Attitudes toward PE in Shaanxi

Stakeholders' perceptions of PE in Shaanxi Province vary according to institutional affiliation, socioeconomic context, and policy awareness. Studies show that while educators and administrators in public universities largely view PE as a strategic Factor of holistic education, their counterparts in private institutions often regard it as supplementary or non-essential (Zhang & Wang, 2021). This perception influences budgetary decisions and limits PE programme expansion in private colleges, directly impacting sustainability outcomes.

Recent qualitative research indicates that students in private colleges express a desire for more structured and engaging PE activities, associating them with mental health benefits, academic performance, and social development (Li & Zhou, 2020).

Parents and community stakeholders also increasingly recognise the role of PE in fostering resilience, teamwork, and discipline among youth. However, inconsistent communication between stakeholders and limited representation of student voices in programme planning remains a challenge.

Therefore, it is essential to promote participatory decision-making and stakeholder engagement in PE policy development, particularly in Shaanxi's private sector. Building awareness about the benefits of sustainable PE among institutional leaders and families can create a shared vision that prioritises investment and innovation in PE programmes (Yuan & Xu, 2023).

4. Issues of Inequity, Access, and Quality in PE Delivery

Disparities in physical education delivery reflect broader systemic inequities in China's higher education landscape. Students in rural and underfunded private colleges often encounter limited access to sports facilities, trained instructors, and inclusive curricula (Wang, 2019). This contrasts with elite public institutions where PE is integrated into broader wellness strategies and supported through government-endorsed programmes. The inequitable distribution of resources compromises the quality of PE education.

Furthermore, the access gap is compounded by gender, disability, and socioeconomic barriers. Female students and students with disabilities are frequently excluded from mainstream PE activities due to a lack of tailored programmes and cultural biases (Sun & Zhang, 2020). These exclusions hinder the fulfilment of Sustainable Development Goals related to inclusive and equitable education (SDG 4) and good health and well-being (SDG 3).

Addressing these issues demands a multidimensional strategy that includes inclusive curriculum reform, facility investment, and targeted policy interventions. Collaboration between public bodies and private institutions is essential to ensure that every student, regardless of background, receives high-quality physical education that fosters lifelong well-being (Tang et al., 2021).

5. Existing Sustainability Measures in PE Programmes

Sustainability in PE is increasingly recognised in national and institutional reforms. Chinese education authorities have introduced several initiatives aimed at promoting physical fitness, reducing sedentary behaviour, and integrating ecological awareness into PE curricula (Ministry of Education of the People's Republic of China, 2021). These policies support green campus campaigns, interdisciplinary PE modules, and digital innovations that promote lifelong learning through physical activity.

In private colleges, some institutions have begun to adopt these sustainability measures, albeit unevenly. Examples include the use of mobile fitness applications, integration of local cultural sports, and efforts to build inclusive, eco-conscious PE environments. However, adoption rates remain low due to budget constraints and a lack of technical expertise (Liu et al., 2022). Institutional inertia and the absence of sustainability assessment frameworks further hinder systematic implementation.

Moving forward, the establishment of measurable sustainability indicators and the inclusion of PE in institutional sustainability audits are crucial steps. Private colleges in Shaanxi can benefit from knowledge exchange programmes with public universities, as well as government grants aimed at promoting innovation in PE delivery. These actions will ensure that PE contributes meaningfully to sustainable education goals across diverse educational contexts (Zhou & He, 2023).

Concept of Key Factors for Developing a Sustainable Strategy in Physical Education Teaching

The integration of sustainable development principles into physical education (PE) aims to nurture students' physical competence, health awareness, and sustainable lifestyle capabilities. Contemporary sustainable PE extends beyond the enhancement of athletic skills and physical fitness by emphasising the holistic development of individuals, which includes physical, mental, and social well-being. It simultaneously addresses the core tenets of sustainability, such as environmental responsibility, resource efficiency, and social equity. The key Factors that underpin the sustainable development of PE include educational policy and regulatory

frameworks, the availability and quality of sports facilities and teaching resources, teachers' professional capacity, student participation and satisfaction, curriculum innovation, technological application, systematic evaluation, and the promotion of lifelong physical activity.

Applying the principles of sustainable development to physical education aims to cultivate students' physical quality, health awareness and sustainable development capabilities. Sustainable physical education not only focuses on the improvement of sports skills and physical fitness, but also pays attention to the comprehensive development of students, including physical, mental and social health, while taking into account the core Factors of sustainable development such as environmental protection, resource conservation and social equity. The Factors of sustainable development of physical education are studied from the following aspects: (1) Education policy and system (2) Sports facilities and resources (3) Teachers' teaching skills and professional knowledge (4) Student participation and satisfaction (5) Curriculum and teaching materials (6) Technology application (7) Evaluation and improvement (8) Lifelong sports

Chao Xu (2023), pointed out in the study: The research is based on the "perception-ability-behavior" paradigm, constructs a theoretical model and verifies the hypothesis, and puts forward the following management suggestions: pay attention to science and technology sports enthusiasts and improve their in-depth leisure level; strengthen government and market , social and individual support to promote the sustainable development of science and technology sports; enhance the communication and ability cultivation of enthusiasts, and improve the ability to cope with restrictions; promote the introduction of science and technology sports into campuses and achieve the integrated development of reserve talent training.

Gong Qingbo (2021), in his research, emphasized the importance of college students' sports participation in promoting healthy growth and social development. Based on the social ecological theory, the study analyzed the environmental impacts and needs of college students' sports participation and found that sports participation is significantly affected by the material, institutional, and cultural

environment, and there is a positive correlation between participation, environmental perception, and gains. University sports culture is the basis for sports participation, and participation experiences at different stages affect the motivation of college students. Through supply reform and system optimization, the quality and effect of college students' sports participation can be improved as a whole.

Yang Ling (2015) pointed out in her research that physical education teaching is not only about teaching skills, but also pays attention to the function of cultural education, including life culture, spiritual culture, aesthetic culture, behavioral culture and national culture. Based on literature, surveys and interviews, this study reveals the current situation and reasons for the lack of cultural character in physical education, such as instrumentalist tendencies and lack of cultural Factors, and proposes improvement measures. The research suggests paying attention to the cultural value of physical education, adjusting teaching objectives and content, innovating teaching methods and evaluation systems, promoting the overall cultural character improvement of physical education, and promoting its cultural tension and vitality in practice.

Qing Kaili, (2017) pointed out: Ecological sports combines the sustainable development concept of spiritual civilization and material civilization, aiming to be people-oriented and promote the all-round development of people. The study found that current college students have low awareness of the concept of ecological sports, but they support its integration into public sports courses. The ecological sports concept is consistent with national policies and the guiding ideology of “health first” and is conducive to the reform of physical education. It is recommended to make full use of the existing physical education resources in colleges and universities, integrate ecological concepts into classroom and practical teaching, innovate teaching organization forms, and strengthen condition guarantees to improve the physical education environment and optimize classroom teaching methods.

Chen Mingqing, Guo Wei, and Zhao Longfei (2024) pointed out: Internet technology provides rich resources and innovative teaching methods for physical

education teaching in colleges and universities, and most teachers have a positive attitude towards Internet teaching training. Students are active in independent learning. It is recommended that colleges and universities increase Internet teaching training courses and combine them with traditional teaching methods to improve the learning experience and teaching effects of teachers and students.

Hou Jie, (2020) pointed out: improve training implementation policies, establish institutional guarantees and reward mechanisms; create a good sports environment, improve resources and cultural atmosphere; strengthen teachers' professional qualities, improve scientific research levels; optimize curriculum design, innovate teaching methods and Evaluation; enrich extracurricular activities, increase activity methods and off-campus exchanges.

Liu Xiaoxiao, (2017) pointed out: In order to improve college students' participation in extracurricular sports, it is recommended that the country should strengthen policy support for student exercise, society should organize extracurricular activities based on students' interests, and schools should update the concept of physical education, enrich curriculum content, and strengthen supervision , and families need to cultivate students' correct sports values.

He Mengtao, (2016) pointed out: The characteristics of MOOC, such as networking, personalization, sharing and fun, are highly consistent with the needs of physical education and can improve educational flexibility and resource utilization efficiency. In order to effectively integrate MOOC and physical education, it is recommended to adopt the following strategies: increase the publicity of MOOC courses, promote the sharing of high-quality resources, form a professional team to produce high-quality courses, strengthen course quality monitoring, learn from MOOC teaching methods to reform physical education, and Explore sustainable development profit models. These measures will help promote the reform and development of physical education.

Zhang Yu and Chen Jiahui, (2023) pointed out: It is recommended to establish a diverse collaborative mechanism to improve the digital literacy of physical education teachers, promote corporate research and development and support in

the field of smart sports, and build an efficient school smart sports management system. These strategies aim to accelerate the implementation and development of digital education through the joint efforts of the government, market and schools, and ultimately achieve high-quality development of physical education and lay a solid foundation for the goal of becoming a sports power.

Yuan Ye, (2022) pointed out: In the teaching process of sports game courses, big data technology should be used to analyze students' learning status before class to formulate accurate teaching plans, and communicate in real time through online tools to improve pre-class learning Effect. In class, student-centered teaching strategies need to be adopted, combined with smart teaching tools for real-time data feedback and analysis, to promote students' active participation and improvement of cooperative inquiry abilities. After class, tailor-made training content is provided based on students' individual differences and sports data to optimize students' course satisfaction and sports ability.

In summarize, achieving sustainable physical education requires a multifaceted approach that addresses various strategic factors. By aligning education policies with sustainability objectives, investing in adequate facilities and resources, enhancing teacher competencies, fostering student engagement, developing relevant curricula, leveraging technology, and implementing effective evaluation mechanisms, educational institutions can cultivate a PE environment that promotes holistic student development and lifelong physical activity. Such comprehensive strategies are essential for embedding sustainability into the fabric of physical education and, by extension, into the broader educational landscape.

The researcher synthesized to identify the Factors of Physical Education Teaching in Private Colleges in Shaanxi Province, as presented in Table 2.1.

Table 2.1 Key Factors for Sustainable Development of Physical Education

Factors / Author	Wang Shuying (2012)	Sun Pengcheng (2007)	Gao Feifei (2007)	Yuan Ye (2022)	Qing Kaili (2017)	Chen Mingqing, Guo Wei, Zhao Longfei, (2024)	Hou Jie, (2020)	Liu Xiaoxiao (2017)	He Mengtao (2016)	Zhang Yu and Chen Jiahui (2023)	Total
1. Policy and Governance	√	√	√	√	√	√	√	√	√	√	10
2. Financial Sustainability and Resource Allocation		√	√		√	√	√	√		√	7
3. Faculty Development and Professional Training	√		√	√		√	√	√	√	√	8
4. Curriculum Design and Innovation	√	√		√	√	√	√		√	√	8
5. Infrastructure and Technology Integration	√		√	√		√	√		√	√	7
6. Community Collaboration and Industry Partnerships	√	√	√			√	√		√		6
7. Student Engagement and Lifelong Learning		√	√	√	√	√	√	√	√	√	9

According to Table 2.1, the researchers analyzed and refined relevant literature, concepts, theories and related studies on the quality of higher education, including Chao Xu et al. The researchers selected corresponding factors as the research framework based on the criteria. The researchers selected factors with a frequency of 6 or more, including the following 7 factors:

1. Policy and Governance
2. Curriculum Design and Innovation
3. Faculty Development and Professional Training
4. Student Engagement and Lifelong Learning
5. Financial Sustainability and Resource Allocation
6. Infrastructure and Technology Integration
7. Community Collaboration and Industry Partnerships

1. Policy and Governance

Policy and governance: Policy and governance refer to the provision of institutional assurance and operational support for the sustainable development of physical education through the establishment of a scientifically grounded and coherent policy framework, alongside an efficient and standardised governance mechanism. At the policy level, this encompasses guidance and incentive measures introduced by governments and educational authorities in areas such as financial investment, teacher development, curriculum reform, and infrastructure provision. Governance pertains to the organisation and administration of physical education, including institutional arrangements and the development of quality assurance and evaluation systems within higher education institutions.

Gao Xiaofeng (2017) pointed out that the motivation for the change of school sports policy mainly includes the interaction of political sources, policy sources and problem sources, among which the political source is dominant. Strengthening legal system construction, improving the promulgation mechanism, and optimizing policy content are important directions for the development of school sports policy in the future.

Zhang Wenpeng (2015) pointed out that China's school sports policy has experienced a transformation from a single type to a complex type, and the policy goals have gradually expanded from simply enhancing physical health to enhancing competitiveness and promoting an active lifestyle. It is recommended that in the future, the effectiveness of school sports policies can be improved by strengthening the diversification and legislation of policy tools, strengthening cultural, social and psychological identities.

In summary, policy and governance are important guarantees for the sustainable development of physical education, covering policy support such as government investment, curriculum reform, and venue construction, as well as the construction of management, system and evaluation mechanism within universities. The changes of school sports policy are mainly affected by the interaction between political flow, policy flow and problem flow, in which political flow plays a leading

role, and the construction of legal system and the optimization of policy system should be strengthened in the future. It is suggested to enhance the pluralism and legislative nature of policy tools, enhance cultural and social identity, so as to comprehensively improve the effectiveness of the policy and promote the development of school sports.

2. Curriculum Design and Innovation

Curriculum design and innovation refers to the systematic planning of objectives, content, instructional methods, and assessment mechanisms for physical education, based on students' physical and psychological developmental needs, institutional orientation, and the evolving societal demand for sports professionals. The curriculum encompasses structured teaching plans, learning activities, content delivery, and evaluation approaches, representing the totality of organised learning experiences provided by the institution.

Zhu Weiqiang (2007) pointed out that teachers lack the awareness and ability based on curriculum standards in curriculum implementation, which makes it difficult to implement the new curriculum concept and the quality of education cannot be guaranteed. Based on the standard curriculum design, the reverse design model and multiple curriculum models are proposed, and the importance of curriculum evaluation is emphasized, calling for the effectiveness of the curriculum plan and the realization of educational goals through evaluation methods with characteristics such as systematicity, fairness and data sufficiency.

Zhang Xiqian (2007) pointed out that physical education teachers play a leading role in curriculum implementation, and their professional growth and implementation ability directly affect the curriculum effect. At the same time, the implementation of physical education curriculum is affected by humanities, management, material and other environments, and schools play a key role in the implementation of physical education curriculum. Curriculum implementation should focus on the dialectical relationship between teacher-led and student-centered, and promote the development of students' health quality, sports cultural literacy and sports lifestyle.

Yuan Shaohui, (2014) pointed out that the American physical education curriculum program focuses more on the understanding of sports and education, while the Chinese program emphasizes the hierarchy and process of sports. By comparing the physical education curriculum programs of the two countries, it can be found that China has shortcomings in curriculum setting, teaching practice and textbook content. Drawing on the successful experience of the United States and combining it with China's actual situation for localization transformation can innovate teaching models and promote the in-depth and scientific development of China's physical education reform.

To sum up, curriculum design and innovation are the key to improving the quality of teaching and student development, and it is necessary to scientifically plan teaching objectives, content and evaluation methods based on curriculum standards, emphasizing practicality and forward-looking. The study points out that teachers' professional ability and implementation awareness are important guarantees for the effectiveness of the curriculum, and the implementation of the curriculum is also affected by multiple factors such as system and environment. Compared with the physical education curriculum in China and the United States, China should optimize the content and methods based on local conditions and learn from advanced experience. In the new era of physical education teaching, the concept of health, scientific and technological means and interdisciplinary integration should be introduced into the classroom, so as to improve the interest and effectiveness of the curriculum, and help the reform of physical education and the construction of "Healthy China".

3. Faculty Development and Professional Training

Teacher development and professional training refers to a systematic, multi-level mechanism aimed at enhancing the professional competence, teaching effectiveness, and developmental capacity of physical education (PE) teachers. This includes not only the advancement of pedagogical skills, but also the strengthening of research capability, curriculum design expertise, interdisciplinary literacy, and proficiency in the application of information technology. Professional training involves

targeted initiatives such as continuing education, practical workshops, research engagement, and exchange programmes regularly organised by higher education institutions and relevant authorities. These efforts are intended to equip teachers with up-to-date concepts, methods, and technologies in PE, enabling them to meet the demands of modern, diversified, and student-centred education.

Zhang He (2017) pointed out that it is necessary to continuously improve teachers' practical ability, reflection ability and lifelong learning ability, and promote the standardization of teacher education. Through measures such as selection, internship teacher qualification review, internship supervision and evaluation mechanism, the quality of physical education teacher education courses has been improved to meet the needs of physical education teachers' professional ability in the new era.

Shao Linhai (2016) pointed out that improving the professional development level of physical education teachers is the key to improving the quality of education in local universities. It should be promoted in a coordinated manner from multiple dimensions, including: changing the value orientation of professional development, stimulating teachers' autonomy, paying attention to educational literacy, and promoting cooperation and exchanges; optimizing internal and external conditions, enhancing teachers' initiative, creating a favorable policy environment, and expanding development paths. These measures will help improve the overall quality of physical education teachers, thereby improving the quality of education in local universities.

Lv Xiaoying (2022) pointed out that in order to improve teachers' teaching skills, suggestions include: improving dedicated training venues, controlling class size, optimizing curriculum settings, increasing skill competitions, establishing a stable internship base, enriching evaluation content and improving feedback mechanisms. At the same time, college teachers should establish a teaching concept centered on students' bodies, create an embodied teaching environment, change teaching thinking, and enrich teaching skills evaluation.

In summary, teacher development and professional training are the key guarantees to improve the quality of physical education teaching, aiming to improve teachers' teaching ability, scientific research literacy and information technology application level through a systematic and multi-level mechanism. Teacher development covers curriculum design, interdisciplinary integration and lifelong learning capacity building, while professional training helps teachers adapt to the needs of education modernization through further education, practical training and research. Teachers should pay attention to the cultivation of reflective ability and practical ability to promote the standardization process of education. At the same time, the overall quality should be improved from multiple dimensions such as value guidance, cooperation and exchange, and policy environment. By optimizing the curriculum, improving the teaching environment and improving the evaluation mechanism, the teaching skills and student-centered teaching concept can be effectively strengthened.

4. Student Engagement and Lifelong Learning

Student Engagement and Lifelong Learning refers to the development of a student-centred teaching system designed to foster learners’ initiative, enthusiasm, and sustained interest in physical education. This approach aims to cultivate students’ awareness and ability to internalise physical activity as an integral part of their lifestyle, thereby promoting the lifelong development of physical literacy.

Chen Changgui and Niu Duan (2001) believe that college students' participatory learning mainly refers to the active participation of college students in classroom teaching, scientific and technological activities, and school management social activities.

Zhao Limin (2002) believes that student participation is the process of students actively participating in teaching activities under the guidance of teachers to achieve the construction and development of students' subjectivity.

Zhao Xiaoyang (2013) pointed out that students' perception of the educational environment directly affects their participation, and participation directly affects students' development and achievement. The perception of the educational

environment has an indirect impact on development and achievement through participation. Based on these findings, specific suggestions for improving the quality of higher education are proposed.

Wang Yuan and Zhou Zuoyu (2018) pointed out that in the period of "connotative development" of education in my country, the differences and diversity of students are becoming increasingly prominent. It is recommended that schools pay attention to the differences in student types, guide students to establish a sense of life meaning, and cultivate adaptive adjustment ability and goal planning and management ability.

Du Guangyou (2014) pointed out that physical education courses should not only emphasize the enhancement of physical fitness, but also focus on the promotion of students' health and let them experience the fun of sports. Through the study of physical education courses, we can develop the awareness, ability and habit of lifelong sports, participate in sports activities for life, live a healthy and happy life, and better repay society and achieve the coordinated development of individuals and society.

Huang Xiaoli (2015) pointed out that the trend of school sports health education in contemporary China is an educational trend with the "health first" trend as the mainstream, and the happy sports trend, lifelong sports trend, and sunshine sports trend as tributaries. These trends promote the development of school sports practice in a specific historical period.

Liu Zhuo (2017) pointed out that physical education is a compulsory subject for contemporary college students and plays an important role in improving the physical fitness of college students. In particular, lifelong physical education in college physical education can help college students form a lifelong sports awareness, which plays an important role in improving the physical fitness of all citizens.

Lan Lan (2017) pointed out that following the development trend of lifelong education in the international community, the legislative concept and planning of lifelong education in my country have been repeatedly put on the agenda. After the

revision of the "Education Law of the People's Republic of China" in 2015, a number of clauses were added to enrich the provisions of lifelong education. It can be seen that the promotion of lifelong education legislation has never stopped.

Liu Zhang (2019) pointed out that lifelong sports refers to a person receiving physical education and engaging in physical exercise throughout his life, making him healthy, happy and benefiting for life. The concept of lifelong sports was proposed at the end of the 20th century. The idea of lifelong sports is a concept that emerged due to people's strong demand for sports both subjectively and objectively.

In summary, student participation and lifelong learning emphasize the construction of a student-centered teaching system, stimulate their enthusiasm and initiative in physical education courses, and cultivate their awareness and ability to participate in physical exercise for life. The study pointed out that students' perception of the educational environment directly affects their participation and development, and schools should pay attention to individual differences and improve their adaptability and goal management capabilities. Physical education courses should not only focus on physical fitness, but also on sports fun and health promotion, so as to help students form lifelong sports awareness and a good lifestyle. With the advancement of education legislation, the concept of lifelong sports has gradually become an important part of modern education, promoting the coordinated development of individuals and society.

5. Financial Sustainability and Resource Allocation

Financial Sustainability and Resource Allocation refers to the capacity of colleges and universities to maintain long-term and stable investment in physical education without reliance on short-term financial subsidies or temporary funding sources. This involves the scientific planning and rational utilisation of teaching resources, including funding, personnel and facilities, within conditions of limited availability. The aim is to enhance the efficiency of resource use and ensure the delivery of high-quality physical education outcomes.

Hu Tingpeng (2016) pointed out: It is recommended to expand funding channels, improve policies, establish demonstration units, professional management,

formulate opening plans that meet needs, reasonably arrange opening hours and charging standards, extend opening hours, and strengthen safety measures and other countermeasures. To improve the comprehensive utilization efficiency and service capabilities of sports venues.

Shi Ping, (2015) pointed out: Although my country's competitive sports and school sports have made significant progress, mass sports still face the problem of lack of venues. It is recommended to improve the effectiveness of the opening of school sports facilities to the outside world by improving safety facilities, standardizing management systems, broadening funding sources, strengthening leadership attention, active publicity and promotion, and flexibly integrating resources.

Gao Hui, (2014) pointed out: Combining domestic and foreign multiple supply theories, it is proposed to promote the effective sharing of sports resources in colleges and universities in Xi'an by improving supply capabilities, improving laws and regulations, improving sharing mechanisms, and establishing social responsibilities. These research results provide theoretical and practical reference for the construction of Xi'an's sports public service system and regional socio-economic and cultural development.

Dong Depeng, (2019) pointed out that the importance of public sports resources as social welfare should be clarified. The study points out that the allocation of public sports resources is based on human, material and financial resources, and realizes regional rational distribution according to policies. In order to scientifically evaluate the level of allocation and the degree of difference, scholars have constructed a multi-dimensional evaluation index system, covering the type, quantity, and service quality of resources, so as to provide theoretical support for the optimization of public sports services.

Wang Jing, (2022) With the improvement of living standards and the promotion of the national strategy of "sports power", public sports resources have become an important guarantee for national fitness. However, due to the relative economic lag in the western region, the supply and demand of public sports facilities

are unbalanced, which restricts the implementation of the strategy and the development of fitness. The study deeply analyzes the dilemma of resource allocation faced by the western region, proposes an optimization path, and emphasizes that it is of great practical significance and strategic value to promote the rational allocation of public sports facilities in the western region under the background of the strategy of "sports power".

Shen Denghong (2024) pointed out that there is an obvious gap between urban and rural areas in terms of sports management personnel allocation, capital investment, venue facilities, event organization and service satisfaction, especially the single resource allocation and low participation of rural communities. It is suggested to meet the fitness needs of urban and rural people by optimizing resource allocation, enriching the forms of physical activities, and improving management efficiency, so as to promote the coordinated development of national fitness and the construction of a strong sports province.

In summary, the importance of financial sustainability and resource allocation efficiency of college sports is proposed, and measures such as broadening funding channels, strengthening management, improving policies and extending opening hours are proposed to improve the utilization rate of sports venues. Many scholars pointed out that the current public sports resources are facing problems such as uneven allocation between urban and rural areas and differences in service quality, and it is necessary to cooperate with government and society, participate in multiple ways, and make scientific layout, so as to promote resource sharing and institutional guarantee. Advocate fairness, efficiency and sustainability, promote the implementation of the strategy of national fitness and sports power, and promote the optimization and development of the public sports service system.

6. Infrastructure and Technology Integration

Infrastructure and Technology Integration refers to the coordinated use of physical facilities, including sports venues, equipment and instructional spaces, together with modern information technologies such as smart sports platforms, teaching management systems and data analysis tools. This integration aims to

enhance the efficiency of physical education teaching and increase student engagement.

Wu Yongping, (2014) pointed out: College sports facilities should be body-oriented, adopt multiple operating forms, promote market operations, and use corporate management methods and various development methods to improve resource utilization.

Li Shouyun, (2014) pointed out: the opening rate of sports venues is low, teacher participation is insufficient, the management system is imperfect, and organizational guidance is lacking. Increase government investment, improve the social service awareness of schools and teachers, strengthen management and incentive mechanisms, and establish communication mechanisms to promote the implementation of the national fitness plan.

Peng Jianbo and Zhou Wenbo (2014) pointed out: With the development of computer technology, informatization has significantly improved the quality and effect of physical education. Through informatization, physical education teaching resources have achieved digitization, multimedia and information sharing, promoting students' active participation and personalized learning. Key measures include establishing a high-quality resource sharing platform, optimizing teaching demonstration and imitation content, promoting scientific research, and strengthening the informatization construction of sports colleges. Together, these measures have promoted the modernization of physical education and improved students' skill levels and overall quality.

Liao Ping (2015), in the study "A Communication Review of the Reform of Physical Education Teaching in the Information Technology Era", explored how information technology affects the transformation of physical education teaching. From the perspective of communication studies, the research analyzes the technical and cultural motivations for physical education in the information technology era, and proposes reform strategies. The study found that information technology has promoted the diversification of physical education content and methods, but the traditional teaching model is still teacher-centered and fails to fully meet the

comprehensive development needs of students. Reform ideas based on information technology include: adjusting the goals, content and methods of physical education teaching, changing the role of teachers, and adapting to the characteristics of digital natives. The study also summarizes the implications of the sports education teaching model for physical education teaching in the information technology era, such as emphasizing student-centered, contextualized teaching and personalized guidance. Finally, the study provides future research directions and recommendations.

Yuan Ye, (2022) pointed out: In the teaching process of sports game courses, big data technology should be used to analyze students' learning status before class to formulate accurate teaching plans, and communicate in real time through online tools to improve pre-class learning Effect. In class, student-centered teaching strategies need to be adopted, combined with smart teaching tools for real-time data feedback and analysis, to promote students' active participation and improvement of cooperative inquiry abilities. After class, tailor-made training content is provided based on students' individual differences and sports data to optimize students' course satisfaction and sports ability.

Zhang Changsheng and Li Lin (2023) pointed out: Artificial intelligence technology is profoundly affecting the field of physical education and accelerating its transformation to personalization, modernization and intelligence. Artificial intelligence technology needs to be strengthened in the following aspects: first, improve the regulation of artificial intelligence applications by laws and regulations; second, promote multi-dimensional collaboration between technology and physical education; third, strengthen artificial intelligence training for physical education workers. Through these measures, we can ensure the safe and reliable application of artificial intelligence technology in physical education and promote the high-quality development of physical education.

Shao Ruifang, (2018) pointed out: Virtual simulation technology can effectively increase students' interest in learning, improve physical fitness (such as running performance, strength and reaction ability), and improve sports skills (such as golf club face angle, track and field javelin throw performance and martial arts Tai Chi

performance). By optimizing the teaching process, providing intuitive data analysis and real-time corrective actions, this technology can stimulate students' interest, improve physical fitness, and improve motor skills better than traditional teaching models.

In summary, the integration of infrastructure and technology is the key to improving the quality and efficiency of physical education. The combination of well-established venues, equipment, and smart platforms enhances resource utilization and student engagement. At present, there are problems such as low utilization rate of facilities and imperfect management system, which need to be solved through government investment, mechanism incentives and social service awareness. The development of information technology has promoted the diversification of physical education content, the modernization of teaching mode, and the promotion of personalized learning and participation of students. Smart teaching tools, big data and artificial intelligence are widely used in pre-class prediction, in-class feedback and after-class customization to help precision teaching. Virtual simulation technology also significantly enhances students' physical fitness and skill performance. The optimization of sports infrastructure needs to be deeply integrated with information technology to achieve the scientific, modern and high-quality development of physical education.

7. Community Collaboration and Industry Partnerships

Community Collaboration and Industry Partnerships refer to the process of establishing diverse cooperation mechanisms with community organisations, sports institutions, enterprises and related industries within the region where colleges and universities are located. This collaboration involves the integration of external resources to jointly advance the alignment of physical education with social services and local economic development.

Liang Qinchao, Shi Zhenguo, and Li Yuan (2020) pointed out that urban community sports in the new era need to solve the contradiction between supply and demand through the overall construction of fitness facilities, the opening of non-community venues, and the formulation of a hierarchical space system, so as to

provide venue guarantee, policy support and community collaboration foundation for the sustainable development of physical education, and help achieve the goal of "Healthy China". Open non-community venues and formulate a hierarchical space system to solve the contradiction between supply and demand, provide venue guarantee, policy support and community collaboration foundation for the sustainable development of physical education, and help achieve the goal of "Healthy China".

Zhu Licai and Wu Yang (2023) pointed out that the sustainable development of the sports industry and regional economy needs to improve the level of human capital, strengthen investment in science and technology, optimize the industrial structure, promote the efficiency of factor utilization guided by market demand, and cultivate professionals through education, enhance industrial innovation capabilities, achieve regional coordination and green growth, and provide an economic and policy synergy path for the sustainable development of the sports industry and education.

Wang Lunguo (2021) pointed out that the sustainable development of physical education needs to promote the addition of sports management majors, vocational training and talent introduction in colleges and universities by improving the management system and team building. Relying on the media to disseminate sports culture, cultivate consumption habits, and promote the integration of industry and education and industrial innovation, so as to build a long-term mechanism for the coordinated development of policy support, perfect facilities, talent reserve and cultural cultivation, and help the sports industry and education system achieve sustainable goals.

Huang Haiyan, (2020) pointed out that the sports industry has the potential to become a pillar industry of the national economy, which is reflected in the characteristics of large scale, strong correlation and strong employment drive. However, its development is constrained by factors such as low participation in sports, imperfect market mechanism, insufficient industrial integration, and imperfect governance system. In order to achieve high-quality development, it is necessary to build a modern sports industry system as the main line, and promote the

transformation and upgrading of the sports industry from the aspects of institutional mechanisms, market entities, sports consumption, and spatial layout.

To sum up, the development of physical education and industry in the new era should rely on community cooperation and industrial cooperation, integrate multiple resources, and realize the integration of education, social services and economy. Urban community sports need to alleviate the contradiction between supply and demand through supply-side reform, overall construction of fitness facilities, opening of non-community venues, and hierarchical spatial layout, so as to help "Healthy China". In order to achieve high-quality development, the sports industry needs to improve human capital, strengthen investment in science and technology, optimize structure, and enhance innovation capabilities and governance system construction. Colleges and universities should add sports management majors, promote the integration of industry and education, cultivate sports consumption culture, and build a sustainable development mechanism. At the same time, the overall level of public sports resource allocation has improved, but there are significant regional differences, which affects the happiness of residents. It is suggested to optimize policies, improve mechanisms, promote fair allocation and social coordination, and promote the coordinated development of sports industry and education.

The Theory of Strategic Planning and Management in Education

Strategic Planning and Management in Education play a vital role in ensuring that educational institutions can effectively respond to changing societal needs, policy directions, and global challenges. By setting clear goals, aligning resources, and systematically monitoring progress, strategic planning helps improve institutional performance and sustainability. Effective management ensures that these plans are translated into action through evidence-based decision-making and stakeholder collaboration.

1. The concept of strategy

Strategy, as an interdisciplinary concept, has been deeply studied in many fields, including but not limited to military, business, psychology, economics, education, sports and game theory. These research fields are often cross-integrated. For example, business strategy research may draw on certain principles of military strategy, while educational strategy research may be influenced by psychology and cognitive science. The core of strategy research lies in understanding how to formulate and implement effective action plans in complex and dynamic environments to achieve predetermined goals. Strategy is generally understood as formulating a plan or plan to achieve a specific goal. It refers to the sum of a series of decisions and measures made under a fixed goal to achieve the intended purpose. Sustainable development strategy is a comprehensive development plan that aims to meet the needs of contemporary humans without compromising the ability of future generations to meet their needs. This strategy focuses on the balanced and coordinated development of the three major areas of economy, society and environment, and pursues long-term stable prosperity and well-being.

Alfred Chandler, (1962): Strategy is a series of long-term decisions to determine the basic goals of an enterprise and allocate resources and position itself in the industry to achieve these goals.

Andrews James and Brian Quinn, (1980): Strategy is a series of related decisions made to achieve organizational goals, including goal setting, resource allocation, and action planning.

Michael Porter, (1980); Strategy is a long-term directional choice designed to achieve a company's dominant position in its industry to create economic profits.

Patrick Weilhane, (1994): Strategy is a value-oriented decision designed to achieve an organization's vision of value and social responsibility.

Tom Peters and Tom Peters, (1994): Strategy is a plan to create the future to achieve the mission and vision of the business.

Bill Joyes, (2001): Strategy is a clear and sustainable direction to achieve the vision and goals of an organization. Although these definitions are different, they all

emphasize the importance of long-term strategy, goal orientation, resource allocation, and organizational action.

In summary: Strategy usually refers to a structured and goal-oriented plan comprising a series of long-term decisions and coordinated actions aimed at achieving specific objectives within defined resource and environmental constraints. It involves situational analysis, goal setting, programme selection, and resource allocation. A sustainable development strategy, in particular, seeks to integrate economic, social, and environmental priorities to ensure present and future well-being.

2. Strategic Planning Processes in Educational Contexts

In an era of rapid societal transformation and increasing demands for accountability, strategic planning has emerged as a critical process within educational institutions. It enables organisations to align their vision, mission, and long-term objectives with the shifting landscape of social expectations, technological innovations, and resource limitations. Strategic planning is not merely a managerial task but a dynamic and participatory process that supports informed decision-making, institutional resilience, and educational sustainability. As observed by Skotnicka-Zasadzien et al. (2024), this process involves a sequence of interconnected stages that foster adaptability and responsiveness in both policy and practice.

A typical strategic planning process begins with environmental scanning, wherein institutions assess external variables such as demographic shifts, economic trends, policy developments, and technological advancements. This step provides a foundational understanding of the broader context in which the institution operates. Following this, stakeholder analysis identifies the needs, priorities, and influence of key actors including students, academic staff, administrative personnel, and external partners. The next phase, goal setting, involves establishing specific, measurable, and time-bound objectives that reflect the institution's values and strategic direction. During the implementation stage, these goals are translated into operational plans with clearly defined roles, responsibilities, and resource

allocations. The final stage, evaluation, involves systematic monitoring and assessment of outcomes, enabling feedback loops that inform future strategic adjustments and promote continuous improvement (Skotnicka-Zasadzien et al., 2024).

In conclusion, strategic planning in educational settings represents a holistic and iterative process that supports institutional success in an increasingly complex environment. By systematically engaging in environmental scanning, stakeholder engagement, goal formulation, strategic execution, and outcome evaluation, educational institutions are better equipped to navigate internal challenges and external uncertainties. Ultimately, robust strategic planning enhances organisational coherence, ensures alignment with national and global educational priorities, and contributes to long-term sustainability and excellence in the education sector.

3. The strategy for sustainable development of physical education

The strategy for sustainable development of physical education encompasses a comprehensive set of measures designed to ensure the long-term relevance, effectiveness, and progression of physical education (PE) within educational institutions. It refers to planned interventions in curriculum design, pedagogical approaches, resource management, assessment mechanisms, and teacher professional development, all of which aim to meet current and future educational demands while fostering students' holistic development in terms of physical fitness, motor skills, and lifelong healthy habits (Bailey et al., 2009). Within this context, sustainability in physical education is not limited to environmental aspects, but extends to curriculum adaptability, equity of access, and social relevance (Hardman, 2011). The goal is to create enduring educational frameworks that are responsive to dynamic societal needs and student wellbeing.

Linking this strategic framework to higher education, particularly private colleges in Shaanxi Province, requires a recognition of both global educational reforms and localised socio-economic conditions. Ding (2015) argued that national education strategies function as a guiding framework to adapt educational development to changing societal and economic trends. Particularly in higher

education, sustainable development is heavily reliant on continuous innovation-transforming knowledge into applicable skills, research outputs, and public service (Ding, 2015). This is especially critical for private institutions, which often face more pronounced resource constraints and competitive pressures compared to public universities (Liu & Wu, 2021). Within physical education, innovation may involve integrating sports technology, promoting interdisciplinary learning, or adapting teaching content to align with national health policies such as the “Healthy China 2030” initiative (State Council of China, 2016).

In summary, sustainable strategies in physical education must be context-sensitive, innovation-driven, and equity-oriented, particularly within the landscape of private higher education. As Tian (2018) noted, strategy serves as a master plan guiding systemic efforts towards global objectives. Therefore, the sustainable development strategy of physical education in private colleges in Shaanxi should not only address immediate pedagogical and institutional needs but also contribute to broader social goals such as health promotion, social inclusion, and sustainable development as outlined in SDG 3 and SDG 4 of the United Nations (UNESCO, 2017). A well-articulated, future-oriented PE strategy can serve as a catalyst for nurturing healthier, more engaged, and socially responsible graduates.

Concept of the Current Situation of Sustainable Physical Education

In the evolving landscape of global education, the integration of sustainability principles into curriculum design has become an increasingly prominent objective. Education for Sustainable Development (ESD), promoted by UNESCO, represents a transformative approach that aligns education with long-term environmental, social, and economic sustainability goals. Physical education (PE), as an essential Factor of holistic development, has gradually embraced this framework in order to enrich learning experiences and foster healthy, responsible citizenship. Within this context, recent research has sought to examine the current state of sustainable physical education and the mechanisms through which it can be effectively implemented across different educational levels and institutional contexts.

Sun Pengcheng (2007) emphasised that ESD, as an internationally recognised educational paradigm, plays a pivotal role in enhancing the quality and scope of school physical education. He asserted that incorporating ESD into PE curricula enriches course content and aligns educational objectives with the broader goals of China's basic education reform. Specifically, ESD influences a range of dimensions within school PE, including goal-setting, implementation processes, allocation of resources, pedagogical values, and evaluation strategies. By embedding sustainable development concepts into physical education, schools are better positioned to cultivate students' physical competencies, social awareness, and commitment to lifelong wellness, elements that are foundational to the long-term advancement of school sports.

Extending this discussion to the higher education sector, Wang Chao (2016) identified several constraints that hinder the sustainable development of competitive sports in Chinese universities. His study highlighted the need for structural reform, especially in dismantling the existing divide between academic education and elite sports training. Wang advocated for the reintroduction of competitive sports into the educational system through the establishment of high-level university sports training centres and the integration of sports into broader educational frameworks. In addition, he recommended adopting international models such as the NCAA system in the United States and incorporating university sports competitions into the national competitive system. These reforms, according to Wang, would facilitate the creation of a diversified and sustainable talent development model within university sports.

Complementing these institutional perspectives, Zhou Qin (2022) provided an applied case study on the Shuangliu Sports Base, which has made tangible progress in advancing national fitness and institutionalising regular sports events. However, challenges remain, particularly with regard to insufficient industrial support and structural imbalances. Zhou proposed a multi-faceted strategy to address these issues, including the optimisation of top-level planning, the expansion and improvement of public sports infrastructure, and the implementation of branding

strategies aimed at boosting public engagement and market vitality. These recommendations underscore the importance of cohesive policy frameworks and targeted investment in sustaining the long-term development of sport-related initiatives.

In conclusion, current research demonstrates that sustainable physical education requires an integrated approach that spans curriculum reform, institutional restructuring, and strategic planning. The incorporation of ESD into PE not only enhances educational content but also supports the broader goals of public health, social equity, and sustainable development. At both the school and university levels, the sustainable advancement of physical education depends on innovative policies, collaborative frameworks, and the proactive alignment of education with the long-term needs of students and society alike.

The Theory of SWOT Analysis and TOWS Matrix

1. Application of SWOT Analysis in Educational Research

SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats) is a strategic planning tool originally developed in business contexts but has found significant relevance in the field of educational research. In academic institutions, SWOT provides a structured framework to assess internal capabilities and external challenges, enabling data-driven decision-making and policy development. It has been widely used for institutional self-assessment, programme evaluation, and policy reform (Gürel & Tat, 2017).

In the context of physical education (PE), SWOT analysis allows researchers and administrators to systematically examine the internal educational environment, such as curriculum design, teacher competence, and resource allocation, as well as external influences like national education policy, health trends, and technological changes (Khan & Quadri, 2020). This analytical method supports the development of strategies that are contextually responsive and evidence-based. When integrated into the planning of sustainable PE programmes in private colleges, SWOT helps identify leverage points for enhancing quality and inclusivity.

The use of SWOT analysis in educational research has expanded as institutions seek strategic solutions to complex challenges. Its value lies in providing a holistic view that balances internal evaluation with external awareness. In the sustainable development of PE teaching strategies, SWOT not only enhances institutional introspection but also aligns strategic planning with broader educational goals and societal needs.

2. Identifying Internal Strengths and Weaknesses in PE Programmes

Understanding internal strengths and weaknesses is a critical step in applying the SWOT framework to physical education (PE) programmes. Strengths often include qualified instructors, comprehensive curriculum design, and supportive institutional policies, while weaknesses may stem from limited funding, outdated facilities, or lack of digital integration (Hill & Westbrook, 1997). These internal factors reflect the capacity of an institution to deliver high-quality, sustainable PE that meets the needs of diverse student populations.

In the context of private colleges in Shaanxi Province, internal assessments reveal both progress and challenges. Strengths such as growing institutional autonomy and increased investment in sports infrastructure coexist with weaknesses like inconsistent teacher training standards and variable student engagement (Yang & Duan, 2021). Conducting internal evaluations helps stakeholders design focused interventions that maximise resource use and address limitations in implementation.

Therefore, a clear understanding of internal conditions enables private colleges to align their strengths with future opportunities and take proactive measures to mitigate weaknesses. Incorporating tools such as faculty performance audits, student feedback mechanisms, and curriculum benchmarking can greatly enhance the effectiveness of PE strategic planning (Stolz & Pill, 2014).

3. Assessing External Opportunities and Threats

External analysis involves identifying factors beyond institutional control that can influence the success of PE programmes. Opportunities may include government support, educational reforms, and growing public awareness of health and wellness.

Threats, on the other hand, may involve budget cuts, changing demographic trends, or competing educational priorities (Kotler & Keller, 2016).

For PE teaching in Shaanxi's private institutions, external opportunities arise from China's Healthy China 2030 strategy and its emphasis on physical fitness education. Additionally, the integration of digital sports technology and international collaboration offers promising avenues for growth. Conversely, threats such as declining student interest in sports, high academic pressure, and unequal access to resources remain significant concerns (Liu et al., 2022).

Recognising external dynamics is essential for building resilient and adaptive strategies. Institutions can leverage emerging policies and technology trends to enhance curriculum delivery while preparing contingency plans for external risks. This external scanning helps inform the opportunities and threats dimensions of the SWOT analysis.

4. Using TOWS Matrix for Strategy Generation

The TOWS matrix builds upon the SWOT framework by systematically aligning internal and external factors to formulate strategic responses. It proposes four sets of strategies: Strength–Opportunity (SO), Strength–Threat (ST), Weakness–Opportunity (WO), and Weakness–Threat (WT) (Weihrich, 1982). This matrix enables decision-makers to go beyond passive analysis and move towards active planning.

In the context of PE programmes in Shaanxi's private colleges, the TOWS matrix can guide the development of tailored strategies. For instance, SO strategies might involve using skilled instructors to capitalise on policy support for health education. WT strategies, meanwhile, could include investing in teacher training and infrastructure to offset both internal limitations and external risks (Gurel & Tat, 2017).

By translating SWOT data into actionable strategies, the TOWS approach provides a structured methodology for aligning institutional development with long-term goals in sustainability and educational excellence. It fosters coherent decision-making that reflects both the internal capacity and external environment of the institution.

5. Examples of SWOT/TOWS Applied in Higher Education Contexts

Several case studies illustrate the application of SWOT and TOWS analyses in higher education. For example, Alshuwaikhat and Abubakar (2008) applied SWOT to assess sustainable campus operations, leading to actionable environmental management strategies. In the domain of physical education, Kim and Cardinal (2015) used SWOT to redesign PE teacher education in South Korea, enhancing the relevance and adaptability of training programmes.

Similarly, Liao and Ho (2020) applied the TOWS matrix to strategic planning in Taiwanese universities, aligning internationalisation efforts with internal readiness and external competitiveness. These examples underscore the adaptability of SWOT/TOWS frameworks to diverse educational contexts, including curriculum reform, organisational development, and quality assurance.

For PE teaching in Shaanxi's private colleges, these international applications provide models for local adaptation. By drawing lessons from global practices, institutions can build robust and context-sensitive strategies that support both academic and sustainable development goals.

6. Steps of SWOT Analysis and the TOWS Matrix

The SWOT analysis and TOWS matrix comprise a systematic sequence of steps designed to evaluate institutional conditions and formulate sustainable strategic responses. The following outlines each stage of the process:

SWOT Analysis Steps

1. Identifying Strengths: his step involves evaluating internal organisational advantages. In the context of physical education (PE), strengths may include institutional emphasis on PE, diversified teaching content, proactive curriculum reform, and effective collaboration between institutions and enterprises in some colleges and universities.

2. Identifying Weaknesses: Institutions must assess their internal limitations, which may encompass an insufficient number of qualified PE instructors, limited professional expertise, inadequate teaching resources, low levels of student engagement, and restricted financial investment in PE programmes.

3. Identifying Opportunities: This stage involves scanning the external environment for favourable conditions. Opportunities include national initiatives such as the “Healthy China” strategy and the “Double Reduction” policy, increasing societal demand for physical fitness, and new employment prospects created by the expanding sports industry.

4. Identifying Threats: Institutions must also recognise potential external risks. These may include intense competition within the higher education sector, inconsistent policy support, the peripheral status of sports within the academic curriculum, and financial and enrolment pressures particularly prevalent in private universities.

TOWS Matrix Steps

1. Formulating SO Strategies: SO (Strengths–Opportunities) strategies aim to utilise internal strengths to capitalise on external opportunities. For instance, leveraging successful school–enterprise partnerships can align with sports industry growth to expand practical training platforms for students.

2. Developing ST Strategies: ST (Strengths–Threats) strategies focus on using existing strengths to minimise or counteract external threats. An example might include employing diverse and established PE curricula to challenge the societal perception of physical education as marginal.

3. Formulating WO Strategies: WO (Weaknesses–Opportunities) strategies seek to use external opportunities to address internal weaknesses. For instance, institutions could utilise national policy support-such as the “Healthy China” initiative-to improve the professional development and training of PE instructors.

4. Developing WT Strategies: WT (Weaknesses–Threats) strategies are defensive in nature, designed to reduce internal vulnerabilities while mitigating external threats. This could include reforming institutional funding mechanisms, optimising internal resource integration, and implementing contingency plans to address declining student numbers and financial constraints.

By following these sequential steps, institutions can develop comprehensive strategies that integrate all four quadrants of the TOWS matrix. These strategies

should be accompanied by short-term and medium- to long-term implementation plans to ensure coherence, effectiveness, and sustainability. It is essential to clearly define responsible departments, establish feasible implementation pathways, and create continuous monitoring and evaluation mechanisms. Such an approach facilitates dynamic adjustments in response to evolving environmental conditions.

Summary and Implications for the Present Study

1. Synthesis of Major Themes and Concepts

Based on the comprehensive review of relevant literature, several core themes have emerged as fundamental to the sustainable development of physical education (PE) teaching in private colleges in Shaanxi Province. These include the theoretical foundation of Education for Sustainable Development (ESD), strategic educational planning frameworks such as SWOT and TOWS, and the specific contextual dynamics of private higher education in China. Key elements identified in the literature include policy and governance, curriculum innovation, faculty development, student engagement, financial sustainability, infrastructure and technology integration, and community-industry collaboration. The literature also highlights the crucial role of participatory planning, digital transformation, and interdisciplinary approaches in enhancing strategic effectiveness.

At the institutional level, the comparative analysis between public and private colleges reveals a disparity in resource allocation, policy implementation, and strategic clarity. While public institutions often benefit from government support and standardization, private colleges demonstrate greater flexibility but face structural limitations. Furthermore, research emphasizes the need to align PE strategies with national development goals, particularly the "Healthy China" policy and the SDGs, while ensuring adaptability to the localized context of Shaanxi Province.

2. Identification of Theoretical and Practical Gaps

Despite growing interest in sustainable PE development, the existing body of literature remains predominantly focused on public institutions, leaving private colleges relatively underexplored. Few studies offer comprehensive strategic

frameworks tailored specifically to the constraints and potential of private institutions. Moreover, while international frameworks such as ESD and SDG 4.7 provide a strong conceptual foundation, their localized operationalization in Chinese private higher education remains limited. Practical implementation challenges such as insufficient infrastructure, weak policy coherence, limited faculty development opportunities, and low student engagement persist across many private institutions. These findings reveal the need for integrated, context-specific strategies that not only address structural deficiencies but also leverage institutional strengths and external opportunities.

In addition, while strategic planning tools like SWOT and TOWS have been used in various educational settings, their application to PE development in private colleges remains limited. This gap signals a methodological opportunity to apply these frameworks systematically, incorporating empirical data from stakeholders and aligning the strategic Factors with measurable sustainability indicators.

3. Justification for Research Objectives and Methodological Approach

In response to the identified gaps, the present study aims to develop a sustainable strategy for PE teaching in private colleges in Shaanxi Province through a mixed-methods design. The research is informed by both theoretical and empirical insights, drawing upon ESD principles and strategic planning models such as SWOT and TOWS. The study seeks to identify and analyze strategic factors influencing sustainable PE, categorized into seven core Factors: (1) Policy and Governance, (2) Curriculum Design and Innovation, (3) Faculty Development and Professional Training, (4) Student Engagement and Lifelong Learning, (5) Financial Sustainability and Resource Allocation, (6) Infrastructure and Technology Integration, and (7) Community Collaboration and Industry Partnerships.

The use of mixed methods, including literature review, stakeholder interviews and survey-based assessments, allows for a holistic exploration of both the internal and external factors affecting PE strategy implementation. The SWOT-TOWS framework offers a structured means of translating this data into actionable strategies, ensuring that the resulting model is not only theoretically robust but also

practically viable. Ultimately, this study contributes to both academic knowledge and policy-making by offering a comprehensive, context-sensitive strategy model that addresses the unique challenges and opportunities of private higher education institutions in China.

Summary of the Conceptual and Research Framework

The research framework underpinning this study is informed by a synthesis of relevant literature and empirical evidence, and is firmly rooted in the theoretical foundations of Education for Sustainable Development (ESD). It incorporates strategic planning methodologies, in particular SWOT analysis and the TOWS matrix, to construct a comprehensive and context-sensitive approach for the sustainable development of physical education (PE) teaching in private colleges in Shaanxi Province.

At the core of the framework lie seven interrelated strategic dimensions:

1. Policy and Governance
2. Curriculum Design and Innovation
3. Faculty Development and Professional Training
4. Student Engagement and Lifelong Learning
5. Financial Sustainability and Resource Allocation
6. Infrastructure and Technology Integration
7. Community Collaboration and Industry Partnerships

These strategic factors are examined within three interconnected dimensions, namely:

1. Institutional Capacity, which includes policy formulation, faculty development, financial planning, and infrastructure improvement;

2. Pedagogical Effectiveness, which centres on curriculum enhancement and student engagement; and

3. External Partnerships, which involve collaboration with communities and industry sectors.

Drawing on both qualitative and quantitative inquiry, the study evaluates the current status of PE teaching in private colleges, identifies internal strengths and weaknesses, and explores external opportunities and threats. SWOT analysis is applied to assess institutional conditions, followed by the application of the TOWS matrix to formulate strategic recommendations that are both responsive and adaptable.

The resulting framework ensures alignment with national educational objectives while being tailored to the unique local context of Shaanxi's private higher education institutions. Furthermore, it provides a replicable and scalable model for other regions that face comparable challenges, offering a robust foundation for educational policy development, institutional enhancement, and sustainable innovation in the field of physical education.

Related Research

The concepts of sustainable education and education for sustainable development (ESD) are frequently used to describe pedagogical practices that promote sustainability. While the former term encompasses a broader educational perspective, the latter is more widely recognised in international discourse. Education for sustainable development represents an interdisciplinary approach that incorporates social, economic, and environmental dimensions, aiming to embed sustainability principles across educational systems, particularly within higher education.

This form of education adopts a people-centred perspective, focusing on the development of learners' capacities to address complex environmental, societal, and economic challenges. It seeks to equip students with essential 21st-century competencies, including the ability to lead sustainable lifestyles and thrive in evolving professional environments. In alignment with the Education 2030 Agenda, the "comprehensively integrated sustainable transformation approach" is grounded in the theory of complex adaptive systems. This framework promotes ecological

adaptability and offers an innovative pathway for the development of a lifelong learning system.

In the context of China, the implementation of ESD presents several challenges, including policy ambiguity, limited foundational support, and inadequate resource allocation. Nonetheless, these obstacles may be addressed through strategic actions such as embedding sustainable development concepts into diverse academic disciplines, designing interdisciplinary curricula, and promoting sustainability through community-based initiatives. Furthermore, it is essential for China to develop theoretical models of sustainable development that are tailored to its unique socio-economic and cultural conditions, thereby advancing high-quality and context-specific sustainable progress across educational and societal domains.

The formulation of a sustainable strategy for physical education (PE) teaching in private colleges within Shaanxi Province has garnered increasing scholarly attention. This chapter synthesises relevant research from both Chinese and international sources, classified into three primary themes: (1) empirical studies on sustainable PE teaching, (2) research on strategic development in higher education, and (3) investigations identifying research gaps and future directions.

1. Empirical Studies on Sustainable Physical Education Teaching

Liu and Li (2017) conducted a qualitative case study in rural Ningxia Province, China, to examine the challenges of sustaining effective PE teaching in under-resourced communities. The research aimed to identify the structural and institutional barriers that undermine the implementation of sustainable PE. By analysing local policy documents and conducting interviews with educational stakeholders, the study found significant disparities in the availability of qualified PE teachers, the inadequacy of infrastructure, and the lack of community awareness regarding the value of PE. The findings emphasised the necessity of decentralised leadership, increased funding, and stronger policy direction tailored to local needs.

In a European context, Kjærland, Baena-Morales, and Ferriz-Valero (2023) explored how Swedish PE teachers incorporate sustainable development (SD) principles into their teaching practices. The study sought to determine the extent to

which teaching content aligns with the United Nations Sustainable Development Goals (SDGs), particularly Agenda 2030. Using a qualitative design that included teacher interviews, surveys, and classroom material analysis, the study revealed that although environmental sustainability is frequently addressed, there is limited integration of broader SDG-related content such as social justice and global citizenship. The authors concluded that clearer curricular guidance and targeted professional development are needed to embed comprehensive sustainability themes within PE instruction.

Building upon the focus on teacher competencies, Frisén, Elmgren, and Baena-Morales (2024) assessed sustainability competencies among Swedish physical education and health (PEH) teachers. The objective of the study was to evaluate the level of knowledge, attitudes, and behaviours related to sustainable development across environmental, social, and economic dimensions. Drawing on a cross-sectional survey of more than 1,100 PEH teachers, the findings indicated that while teachers generally demonstrated high competence in environmental and social aspects of sustainability, economic literacy was comparatively lower. Moreover, female teachers consistently reported higher levels of sustainability awareness than their male counterparts. This large-scale empirical investigation contributes important baseline data for future professional development initiatives and curriculum reform.

Zhang Wei (2020) examined the challenges inhibiting the implementation of sustainable PE in private colleges across China. Through policy document analysis and semi-structured interviews with educators and administrators from 12 private universities situated in Eastern and Western China, the study identified policy inconsistencies, limited funding, and the absence of a robust sports culture as primary barriers to sustainable PE development.

Feng Xiaomei (2021) explored how cultural perceptions influence student and faculty engagement in PE across five private colleges. Using a mixed-methods approach comprising questionnaires and focus group discussions with 350 undergraduate students, the findings revealed that PE is often undervalued in

comparison to academic subjects, underscoring the necessity of reshaping cultural attitudes to foster sustained participation in PE activities.

Wang Jing and Chen Li (2022) investigated the impact of infrastructural and policy conditions on the sustainability of PE programmes. Through case studies and infrastructure audits conducted in 10 private universities in Central China, the research concluded that inadequate facilities and ambiguous policy directives severely undermine effective and sustainable PE delivery.

2. Research on Strategic Development in Higher Education

Liu Zhen and Wang Lin (2019) conducted a comparative study on strategic planning processes between public and private universities in China. Based on data from 16 institutions and utilising case studies and stakeholder interviews, their research indicated that public universities typically adopt more formalised, government-aligned planning frameworks, whereas private institutions tend to be more flexible but lack strategic coherence.

Lohmann, Meier, and Wei (2021) examined strategic development trends in Chinese higher education in the context of global competitiveness. Through policy analysis and institutional performance reviews, the study found that strategic agendas in public universities are predominantly shaped by national policy, while private colleges require more context-specific strategic frameworks to remain competitive.

Zhang Hui (2022) evaluated the efficacy of cross-sector collaboration in university strategic planning. Drawing upon data from five pilot universities with established industry partnerships, the study employed project evaluations and interviews to demonstrate that such collaborations enhance innovation and resource efficiency, especially within PE and general education.

Li Nan and Zhao Ying (2023) investigated the role of digital tools in strategic planning in eight universities undergoing digital transformation. Through digital readiness surveys and policy document analysis, the study concluded that successful integration of digital tools hinges on institutional leadership, faculty capacity-building, and strategic alignment with institutional goals.

3. Related Research on the Current Status of Sustainable Physical Education

Sun Pengcheng (2007) conducted a study titled Research on the Integration of Sustainable Development Education into School Physical Education Curriculum. The objective of this research was to examine how the concept of Education for Sustainable Development (ESD), promoted by UNESCO, could be applied to enrich and improve physical education (PE) courses in schools. The findings revealed that ESD contributes significantly to the enhancement of PE by influencing various dimensions such as curriculum goals, teaching implementation, resource use, course functions, and assessment strategies. Furthermore, the study emphasised the compatibility of ESD principles with the objectives of China's basic education reform, suggesting that integrating ESD into PE can facilitate the sustainable development of school sports.

Wang Chao (2016) explored the Constraints and Development Strategies of Competitive Sports in Chinese Universities. The study aimed to identify barriers hindering the sustainable development of university-level competitive sports and to propose practical reforms. Key findings pointed to the urgent need for structural reforms in the management of competitive sports within higher education. Wang recommended re-integrating competitive sports into the educational system by establishing high-level sports training centres and adopting models such as the NCAA from the United States. These strategies aim to resolve contradictions between academic learning and athletic training while building a diversified and sustainable sports talent development model.

Zhou Qin (2022) undertook research titled Sustainable Development of Shuangliu Sports Base under the National Fitness Strategy. The purpose of the study was to evaluate the progress and challenges in promoting sustainable sports development through the Shuangliu Base. The results indicated that while the base had achieved certain milestones in the normalisation of sports events and mass fitness promotion, it faced issues such as insufficient industrial support and structural imbalances. Zhou proposed strategies including optimised top-level design, improved public sports infrastructure, and brand strategy implementation to enhance

management capacity, market responsiveness, and the overall sustainability of physical education and sports facilities.

In summary, these studies demonstrate a shared emphasis on the role of ESD in advancing the sustainable development of physical education. They highlight the necessity of reforming educational practices, investing in infrastructure, and adopting strategic management to ensure that PE programmes remain relevant, inclusive, and impactful in the long term.

4. Related Research on SWOT Analysis and the TOWS Matrix

Numerous scholars have investigated the application and evolution of SWOT analysis and its integration with the TOWS matrix in the context of strategic planning. Panagiotou (2003) examined the theoretical development of SWOT analysis and its practical relevance in contemporary decision-making. His study traced the conceptual origins of the model and called for a more systematic and context-specific application. Panagiotou emphasised that when rigorously applied, SWOT remains a valuable strategic management tool. He further argued that combining SWOT with frameworks such as the TOWS matrix significantly enhances its utility by facilitating the development of strategies that are both internally coherent and externally responsive.

Building on this foundation, Weihrich (1982) introduced the TOWS matrix as a natural extension of SWOT analysis. His model provides a more structured and action-oriented framework by pairing internal strengths and weaknesses with external opportunities and threats. The study outlined how SO (Strength-Opportunity), ST (Strength-Threat), WO (Weakness-Opportunity), and WT (Weakness-Threat) strategies can be systematically derived. This method enables organisations to craft well-informed strategic responses that enhance their competitiveness and adaptability in dynamic environments.

Further expanding the empirical foundation, Helms and Nixon (2010) conducted a comprehensive review of the use of SWOT analysis across various sectors, including education, business, healthcare, and non-profit management. Their findings affirmed the model's enduring popularity and versatility. However, the authors also identified common limitations such as inadequate prioritisation of factors and over-

simplification. Nevertheless, they maintained that these issues can be effectively mitigated through integration with analytical tools like the TOWS matrix, thereby reinforcing the model's applicability to evidence-based strategic decision-making.

Dyson (2004) provided a practical case study illustrating the application of SWOT analysis in a higher education context. His work focused on the strategic planning process at the University of Warwick, highlighting the importance of engaging multiple stakeholders, validating strategic insights with empirical data, and using the TOWS matrix to formulate balanced, realistic, and forward-looking strategies. Dyson's study serves as a model for other educational institutions aiming to align their internal capabilities with shifting policy directives and external pressures.

Together, these studies illustrate the continued relevance of SWOT analysis as a foundational tool for strategic planning. When enhanced through integration with the TOWS matrix, it offers a robust and systematic approach for developing context-sensitive, forward-oriented strategies in both educational and organisational settings.

5. Research Gaps and Opportunities for Future Studies

Baena-Morales, López-Meneses, and Sánchez-Rivas (2022) conducted a comprehensive literature review encompassing 45 peer-reviewed articles, proposing a multidimensional sustainability framework for PE in higher education. Their synthesis highlighted the necessity of integrating ecological, psychological, and social dimensions to ensure sustainable PE strategies.

He Rui (2023) proposed a context-specific strategic model for private colleges in Shaanxi Province. Employing the Delphi method and implementing strategic interventions across four institutions, the study illustrated that stakeholder-inclusive strategies demonstrate greater practicality and contextual relevance.

Zhang Min and Tang Wei (2021) investigated the incorporation of Education for Sustainable Development (ESD) principles into sports curriculum design. Using interviews and curriculum analyses from three universities, they emphasised the need to integrate ESD learning outcomes, particularly those related to environmental literacy and global citizenship.

Smith and Roberts (2020) examined the role of participatory planning in enhancing institutional strategy across universities in the UK and Australia. Using surveys and participatory action research, the findings indicated that stakeholder involvement significantly improves strategic ownership, alignment, and institutional responsiveness.

Huang Lei (2023) addressed the issue of resilience in PE strategies in the post-pandemic era. Studying six Chinese universities through document analysis and interviews, the research advocated for flexible teaching models, integration of student well-being, and institutional resilience planning in future PE programming.

In summary, the reviewed literature presents a complex and evolving landscape for sustainable PE strategy development in higher education. Empirical research underscores the importance of infrastructure, institutional support, and cultural factors. Studies focusing on strategic development highlight the need for alignment with national reforms and technological advancement. Meanwhile, forward-looking research advocates for localised, inclusive, and sustainability-oriented strategic frameworks, especially in private higher education institutions. Collectively, these findings form a critical foundation for the present study and inform its conceptual and methodological direction.

Chapter 3
Research Methodology

The research on the development of a sustainable strategy for physical education teaching in private colleges in Shaanxi Province employs a mixed-methods approach, integrating both qualitative and quantitative designs. It adopts a convergent parallel design. The research methodology is outlined as follows:

1. To study the current and expected situation of sustainable development of physical education teaching in private colleges in Shaanxi Province.

2. To develop strategies to influence the sustainable development of physical education teaching in private colleges in Shaanxi Province.

3. To evaluate the feasibility and adaptability of strategy for the sustainable development of physical education teaching in private colleges in Shaanxi Province.

In order to solve the problems mentioned in Chapter 1 and achieve the above research objectives, the researchers have the following procedures:

1. The population / the sample Group
2. Research Instruments
3. Data Collection
4. Data Analysis

Research Methods and Stages

This study employed literature analysis and a questionnaire survey to collect data. The literature analysis examined relevant domestic and international studies on talent cultivation and physical education teaching in private colleges in Shaanxi Province.

The research focused on analysing the current and expected conditions of sustainable development in physical education (PE) teaching, formulating appropriate strategies, and evaluating their feasibility and adaptability.

The research tools and data collection time for each stage are shown in the following table:

Table 3.1 The research tools and data collection time

Stages	Research Instruments	Time
Stage 1	Document review	May to July 2024
	Questionnaire	October 2024 to February 2025
Stage 2	Focus Group Discussion Form	March to April 2025
	SWOT Analysis	March to April 2025
Stage 3	Evaluation Form	March and May 2025

The study was conducted in three systematically organised stages with the research tools and results for each stage, each aligned with the research objectives and underpinned by rigorous educational research methodology, as follows:

Table 3.2 Research tools and results for each stage

Stage	Source of Research Data	Research Results
Stage 1: Analysis of Current and Expected Situations and Priority Needs	- Document Review (Relevant documents and studies) - Questionnaire Survey (200 respondents: roles, experience, and institution type; 100% response rate)	- Identified seven essential components of a sustainable strategy for PE teaching in private colleges in Shaanxi Province. - Assessed current situation, expected situation, and priority needs for sustainable development.

Table 3.2 (Continued)

Stage	Source of Research Data	Research Results
Stage 2: Development of Strategies	Focus Group Discussion Form Needs and SWOT Analysis (Strengths, Weaknesses, Opportunities, Threats)-TOWS Matrix	Analysed internal and external factors influencing PE teaching. - Constructed a TOWS Matrix to match opportunities/threats with strengths/weaknesses. - Developed a draft sustainable strategy for PE teaching. - Refined the strategy based on expert feedback in focus group discussions.
Stage 3: Evaluation of Strategy Feasibility and Adaptability	Expert Evaluation and Validation (Focus on feasibility, adaptability, and relevance to local context)	- Strategy was evaluated as feasible and adaptable for private colleges in Shaanxi Province. - Validation confirmed alignment with institutional needs and sustainable development goals.

Stage 1: To study the current and expected situation of sustainable development of physical education teaching in private colleges in Shaanxi Province

This stage aimed to explore the existing and anticipated states of sustainable PE teaching in private colleges. It comprised two components:

1.1 Examine concepts and theories from relevant literature, policy documents, and authoritative publications.

An in-depth review of academic literature, policy documents, and empirical studies was undertaken to establish a theoretical foundation and contextual understanding. This process helped identify core constructs and trends related to sustainability in higher education and PE teaching practices.

Instrument

The literature study serves as a critical foundation for scientific research. A thorough analysis of existing literature enables researchers to gain a comprehensive understanding of the current state of knowledge within the relevant field, as well as to identify existing research gaps. Furthermore, it assists in evaluating the feasibility and significance of the proposed research problem.

In this study, particular attention was given to the current research conducted by both domestic and international scholars concerning the sustainable development of education. Relevant theoretical perspectives and empirical findings were systematically reviewed and synthesised. Drawing upon successful practices identified in the literature and considering the specific context of the research setting, the study was designed to align with the actual conditions of the research subject.

Data Collection

1. Research Methods: Extensive review and systematic review of academic literature, research reports, policy documents and authoritative publications in related fields such as physical education teaching and sustainable development in colleges and universities. Through the induction, comparative analysis of the existing research results, the views and data with theoretical guiding significance for this topic are extracted, which provides theoretical support for the construction of the research framework and problem analysis of this paper.

2. The sources are literature, policy documents and authoritative publications.

3. The variable of this study is to develop a strategy for the sustainable development of physical education teaching in private collegesin Shaanxi Province

4. The research tool is the literature research method (literature analysis)

5. Researchers collect data from literature, policy documents, and authoritative publications.

6. The researchers used a combination of qualitative and quantitative methods to summarize the essence of the development of sustainable development strategies for physical education teaching in private collegesin Shaanxi Province.

Data Analysis

1. Content Analysis: Patterns and recurring themes were identified from the reviewed literature.

2. Thematic Analysis: The data were classified into categories based on key influencing factors.

3. Synthesis of Findings: The results were synthesised to formulate a sustainable strategy for physical education teaching.

1.2 Survey of Current and Expected Conditions

Questionnaire survey of 200 PE teachers and PE administrators.

A structured questionnaire was distributed to relevant stakeholders to collect quantitative data on the current situation and future expectations for sustainable PE teaching. The findings identified gaps between present practices and desired outcomes, guiding the next phase of strategy development.

The Population/Sample group

Population:

A total of 900 physical education teachers and sports administrators from 32 private colleges in Shaanxi Province. (data from Shaanxi Provincial bureau of statistics)

The Sample Group:

This study will select representative institutions from various regions of Shaanxi, with a focus on private institutions. A stratified sampling method was used to select physical education teachers and sports administrators from 8 private colleges in Shaanxi Province. A total of 200 physical education teachers and sports administrators from these eight private colleges were surveyed using a cluster sampling method.

Sampling Method

This study employed a cluster sampling technique to select 25 percent of the total 32 private colleges in Shaanxi Province as the research sample. To ensure both feasibility and representativeness in data collection, the sampling was limited to private colleges located within Xi'an City, the provincial capital. For this purpose, Xi'an was initially stratified into four geographical zones: northern, southern, eastern, and western regions. Within each zone, simple random sampling was conducted by drawing lots to select two private colleges. As a result, a total of eight colleges were selected, with two colleges drawn from each geographical zone, thereby ensuring balanced regional representation among the sampled institutions.

Subsequently, a total of 200 participants, comprising physical education teachers and sports administrators from the selected colleges, were surveyed. This sampling approach ensured that the data collection was both manageable and sufficiently representative of the broader private college population in the province. The use of cluster sampling was appropriate for addressing the geographical distribution of the population and enhancing the practical implementation of the study within the defined research scope.

The sample group consisted of 200 participants, as shown in Table 3.1.

Table 3.3 Sample Size Summary (PE Teachers & Administrators)

No	Education Institutions	Sample Group		Reason
		Physical Education Teachers	Sports Administrators	
1	Haojing College of Shaanxi University of Science and Technology	16	3	Independent colleges (Xixian New District)
2	Xi'an Innovation College of Yan'an University	16	3	Independent Colleges in Xi'an (South Xi'an)

Table 3.3 (Continued)

No	Education Institutions	Sample Group		Reason
		Physical Education Teachers	Sports Administrators	
3	The Hi-Tech College of Xi'an University of Technology	11	1	Remote Independent Colleges (North of Xi'an)
4	Xi'an Peihua University	35	7	The first private undergraduate school in Shaanxi
5	Xi'an International University	35	7	Xi'an Private Undergraduate (West of Xi'an)
6	Shaanxi University of International Trade & Commerce	32	6	Private collegesin Xixian New Area
7	Xi'an Mingde Institute of Technology	38	7	Private Universities in Xi'an (South of Xi'an)
8	Xi'an Haitang Vocational College	17	3	Xi'an Private College (East Xi'an)
Total		**163**	**37**	
		200		

Research Instrument

Questionnaire Design and Construction

Based on the conceptual framework developed from the literature review, a structured questionnaire was designed to collect empirical data. The questionnaire consisted of three parts:

Part 1 included demographic information of the respondents (e.g., occupation, years of service, and work background).

Part 2 assessed the current and expected situations of physical education teaching in private colleges across seven dimensions:

1. Policy and Governance
2. Curriculum Design and Innovation
3. Faculty Development and Professional Training
4. Student Engagement and Lifelong Learning
5. Financial Sustainability and Resource Allocation
6. Infrastructure and Technology Integration
7. Community Collaboration and Industry Partnerships

A five-point Likert scale was used to measure the level of agreement, interpreted as follows:

5 indicates that the level of the current/expected situations of sustainable development of physical education teaching in private colleges in Shaanxi Province is at the highest level.

4 indicates that the level of the current/expected situations of sustainable development of physical education teaching in private colleges in Shaanxi Province is at a high level.

3 indicates that the level of the current/expected situations of sustainable development of physical education teaching in private colleges in Shaanxi Province is at a moderate level.

2 indicates that the level of the current/expected situations of sustainable development of physical education teaching in private colleges in Shaanxi Province is at a low level.

1 indicates that the level of the current/expected situations of sustainable development of physical education teaching in private colleges in Shaanxi Province is at the lowest level

Part 3 consists of open-ended questions designed to gather additional opinions to support the development of the strategy. It includes the following three open-ended items:

1. In your opinion, which of the 35 questionnaire items across the seven dimensions represent external factors that are beyond the control or direct management of the university?

2. Please provide any suggestions that may contribute to the development of the proposed strategy.

3. Other recommendations (please specify):

The process of constructing a questionnaire

The questionnaire construction process involved the following steps:

1. Review and analyze the literature, concepts, theories and research related to physical education teaching in private universities.

2. Compile a questionnaire on the current situation of physical education teaching in private universities. The outline of the questionnaire is then sent to the supervisor for review and revision.

3. Content Validity

The content validity of the questionnaire was evaluated using the Index of Item-Objective Congruence (IOC) method, as proposed by Foote (1988). This process involved expert validation by five specialists in education and physical education, whose names are provided in the Appendix (page 213). Each item was independently assessed by the experts using a three-point scale: +1 indicating clear congruence with the objective, 0 indicating uncertainty, and −1 indicating clear incongruence. The IOC value for each item was calculated using the formula:

$$IOC = \frac{\sum R}{N}$$

Where:

IOC = Index of Item-Objective Congruence

∑R = Total score assigned by all experts

N = Number of experts

According to the acceptance criteria, an IOC value of 0.50 or higher was deemed acceptable.

Based on this criterion, all 35 items in the questionnaire achieved IOC values ranging from 0.60 to 1.00, indicating satisfactory content validity. Consequently, all items were retained in the final version of the instrument.

4. The questionnaire was revised based on the experts' suggestions.

5. Pilot Testing: A pilot study was conducted with 20 physical education teachers to test the instrument's reliability. Cronbach's alpha coefficient was calculated, resulting in a reliability score of 0.88, with item discrimination indices ranging from 0.42 to 0.89.

6. Finalisation: Based on expert feedback and pilot results, the questionnaire was revised and approved by the academic advisor before being used in the main data collection phase.

7. This questionnaire survey involved a total of 200 physical education teachers and sports administrators from 8 private colleges in Shaanxi Province.

Data collection

Objective1: To study the current and expected situation of sustainable development of physical education teaching in private colleges in Shaanxi Province. The method of data collection is as follows:

1. The researchers asked for a letter from the Graduate School of Bansomdejchaopraya Rajabhat University requesting the collection of data from 200 physical education teachers and sports administrators from eight private universities in Shaanxi Province.

2. The researchers distributed questionnaires to 200 physical education teachers and sports administrators in 8 private collegesin Shaanxi Province to ensure a 100% recovery rate of the questionnaires.

Data analysis

The researcher analysed the data through the software package program as follows:

1. Analyze the frequency and percentage of the personal information of the respondents, and classify them according to occupation, length of service, work background.

2. Using descriptive statistics, the questionnaire data were analysed to examine the status of sustainable physical education teaching in private colleges in Shaanxi Province through frequency distribution, percentage, mean, and standard deviation.

3. A software package was utilized to summarize and analyze the results statistically. The analysis involved calculating the mean and standard deviation (S.D.) to assess the overall trends. Additionally, the PNImodified (Priority Need Index) was applied to determine the significance of the needs, using the formula adapted by Suwimon Wongwanich (Wongwanich, 2005, p. 279).

$$PNI_{Modified} = \frac{I-D}{D}$$

PNI Represents the priority needs index.

I Represents the average score of the expected situations of sustainable development of physical education teaching

D Represents the average score of the current situations of sustainable development of physical education teaching

The mean data based on Rensis Likert (1932) is interpreted as follows:

4.50 - 5.00 expresses the highest level

3.50 - 4.49 expresses high level

2.50 - 3.49 expresses the level

1.50 - 2.49 expresses low level

1.00 - 1.49 expresses the lowest level

Stage 2: To develop strategies to influence the sustainable development of physical education teaching in private colleges in Shaanxi Province.

This stage focused on the strategic development process to promote the sustainable teaching of physical education (PE) in private colleges in Shaanxi Province. It comprised four systematic steps: contextual and needs analysis, SWOT analysis, construction of the TOWS matrix, and drafting of the strategic framework. Each step is detailed below.

2.1 Contextual and Needs Analysis

The first step involved a contextual and needs-based assessment to inform strategic planning. The analysis utilised both quantitative and qualitative data gathered in Stage 1, examining internal and external environmental factors that influence PE teaching in private colleges.

Internal Environment

The internal environment included factors such as institutional capacity, faculty qualifications, teaching resources, student engagement, infrastructure, and curriculum relevance. These were assessed through questionnaire responses provided by administrators, teachers, and students.

High $PNI_{Modified}$ values indicated critical gaps (needs), while lower values suggested areas of strength or minimal concern.

External Environment

The external context was analysed through a review of national and provincial policies (e.g., Healthy China 2030, Double Reduction policy), demographic trends, labour market demands, and feedback from expert interviews. These provided insights into opportunities for strategic development, as well as external challenges such as limited policy support for private colleges and heightened competition.

2.2 SWOT Analysis

The second step involved the categorisation of internal and external factors into four strategic dimensions: strengths, weaknesses, opportunities, and threats

(SWOT). This was based on the integrated results from the $PNI_{Modified}$ analysis and qualitative data.

Internal Factors – Strengths and Weaknesses

Each item from the quantitative survey was analysed using the $PNI_{Modified}$ index and compared to the average $PNI_{Modified}$ score to determine its classification:

Strengths (S): Items with $PNI_{Modified}$ values equal to or lower than the overall average, indicating satisfactory or strong performance. These are areas where institutions can build or maintain success.

Weaknesses (W): Items with $PNI_{Modified}$ values higher than the average, reflecting deficiencies or areas requiring improvement.

External Factors – Opportunities and Threats

The data obtained from respondents' open-ended feedback were thematically analysed to identify external factors. The classification criteria included:

Opportunities (O): Emerging trends or favourable policy directions (e.g., increased national emphasis on sports and fitness, growing social demand for health professionals) that could be harnessed for development.

Threats (T): Potential external challenges (e.g., inconsistent funding, lack of integration with public policy, marginalisation of private institutions) that may hinder progress if left unaddressed.

Procedures Followed

$PNI_{Modified}$ Calculation and Classification: Questionnaire responses were scored, and $PNI_{Modified}$ values were computed.

1. Comparative Analysis: Items were benchmarked against the average to categorise internal factors and external factors.

2. Expert Review: SWOT elements were validated by experts in physical education and strategic planning to ensure contextual relevance and analytical accuracy.

In conclusion, The results obtained from the questionnaire data in this study were analysed based on the average values of the priority needs. The analysis was conducted as follows:

The assessment of priority needs, strengths, and weaknesses was based on internal factors. Items with a $PNI_{Modified}$ index lower than or equal to the overall average were classified as strengths, while those with a $PNI_{Modified}$ index higher than the average were classified as weaknesses.

The assessment of priority needs, opportunities, and threats was based on external factors. Items with a $PNI_{Modified}$ index lower than or equal to the average were considered opportunities, whereas those with a $PNI_{Modified}$ index higher than the average were considered threats.

The results of the SWOT analysis were subsequently used to draft strategies through the TOWS Matrix in the next stage of the research.

2.3 TOWS Matrix Construction

Following the SWOT analysis, the TOWS matrix was constructed to convert diagnostic data into strategic directions. The matrix was used to formulate four types of strategies:

SO (Strengths–Opportunities) Strategies:

Capitalise on internal strengths to exploit external opportunities.

Example: Leverage existing curriculum innovation capacity to implement national sports policies.

ST (Strengths–Threats) Strategies:

Use internal strengths to counteract or mitigate external threats.

Example: Utilise strong faculty networks to compensate for weak government support.

WO (Weaknesses–Opportunities) Strategies:

Address internal weaknesses by taking advantage of emerging opportunities.

Example: Improve teaching infrastructure by applying for competitive funding aligned with national health initiatives.

WT (Weaknesses–Threats) Strategies:

Formulate defensive strategies to reduce both internal and external vulnerabilities. Example: Develop online PE modules to reduce reliance on limited campus resources and combat declining enrolment.

This step ensured that the insights derived from data analysis were systematically translated into practical, prioritised strategic options aligned with institutional and policy contexts.

2.4 Drafting the Strategic Framework

The final step in this stage involved the formulation of a preliminary strategic framework for promoting sustainable physical education (PE) teaching in private colleges in Shaanxi Province. This framework was developed based on the results of the SWOT–TOWS analysis and contextualised within both national development priorities and the institutional challenges identified in earlier stages.

Vision

To develop a sustainable, inclusive, and high-quality physical education (PE) teaching system in private colleges in Shaanxi Province that fosters lifelong learning, enhances student well-being, promotes professional excellence, and aligns with national development goals and global sustainable education principles.

Strategic Goals, Targeted Initiatives, and Performance Indicators

The strategic framework was structured around seven interrelated components critical to the sustainability of PE teaching. Each component includes strategic goals (long-term development objectives), targeted initiatives (actionable programmes or reforms), and performance indicators (measurable outcomes used to track progress and impact):

Strategic Framework Overview for Promoting Sustainable Physical Education Teaching in Private Colleges in Shaanxi Province

The strategic framework for promoting sustainable physical education (PE) teaching in private colleges in Shaanxi Province comprises seven key components. Each component includes strategic goals, targeted initiatives, and clear performance indicators as follows:

1. Policy and Governance: Focuses on developing and revising institutional policies related to PE teaching and establishing dedicated committees to oversee strategic planning and implementation.

2. Curriculum Design and Innovation: Aims to modernise PE curricula by integrating sustainability concepts, sports technology, and holistic health education.

3. Faculty Development: Enhances the professional capacity of PE educators through structured training programmes and academic exchange initiatives with leading institutions.

4. Student Engagement and Lifelong Learning: Encourages active student participation through PE clubs, sports events, and flexible, modular learning opportunities that support lifelong physical activity.

5. Financial Sustainability: Ensures dedicated budgeting for PE teaching and secures diverse funding from government programmes, private sponsors, and alumni networks.

6. Infrastructure and Technology Integration: Upgrades PE facilities and incorporates digital technologies to improve teaching quality and accessibility.

7. Community Collaboration and Industry Partnerships: Builds partnerships with external organisations to support internships, community outreach, and real-world learning experiences in health and sports sectors.

The draft strategic framework was formulated to align with the overarching vision of sustainable development, ensuring internal consistency, practical feasibility, and responsiveness to the findings from the SWOT and TOWS analyses. Designed as a concrete and actionable roadmap, the framework addresses both systemic challenges and emerging opportunities in the context of PE teaching in private colleges. It serves as a foundational basis for expert validation in the subsequent research phase, where further feedback will be incorporated to refine and finalise the strategy for practical implementation.

2.5 Refinement of the Strategy through Focus Group Discussion

A focus group discussion was conducted with 11 experts, selected using purposive sampling. The data obtained were analyzed using content analysis.

The development of the revised Sustainable Strategy for Physical Education Teaching in Private Colleges in Shaanxi Province was carried out through the following steps:

Target Group

The target group comprised physical education experts from eight private universities in Shaanxi Province.

Purposive sampling was employed to select 11 experts in the field of sports education, including six physical education teachers, two sports management personnel, and three professionals from the sports industry.

The inclusion criteria for physical education teachers and sports management personnel were as follows:

1. Possession of a master's degree or higher;

2. A minimum of five years of professional experience at the institution;

3. Holding a senior professional title and possessing a sound theoretical foundation in education;

4. Familiarity with institutional development planning, physical education management, and student development.

The three selected sports industry experts were recognised for their significant influence on strategic planning for physical education in private universities, sustainable sports development, and the promotion of students' learning abilities. Their qualifications were as follows:

1. More than 15 years of professional experience;

2. Possession of a senior professional title;

3. Occupation of a senior leadership position.

Table 3.4 List of Focus Group Interviewee

NO	Education Institutions	Focus Group Interviewee	Reason
1	Haojing College of Shaanxi University of Science and Technology	2	Independent colleges (Xixian New District)
2	Xi'an Innovation College of Yan'an University	1	Independent Colleges in Xi'an (South Xi'an)
3	The Hi-Tech College Of Xi'an University Of Technology	1	Remote Independent Colleges (North of Xi'an)
4	Xi'an Peihua University	2	The first private undergraduate school in Shaanxi
5	Xi'an International University	1	Xi'an Private Undergraduate (West of Xi'an)
6	Shaanxi University of International Trade & Commerce	2	Private collegesin Xixian New Area
7	Xi'an Mingde Institute of Technology	1	Private Universities in Xi'an (South of Xi'an)
8	Xi'an Haitang Vocational College	1	Xi'an Private College (East Xi'an)
	Total	**11**	

Research Instrument

Focus Group Discussion Form

Focus group discussion form Through questionnaire survey and analysis of the current status of sustainable development of physical education teaching in private collegesin Shaanxi Province, a corresponding structured focus group interview form was formulated from seven aspects, including

1. Policy and Governance
2. Curriculum Design and Innovation
3. Faculty Development and Professional Training
4. Student Engagement and Lifelong Learning
5. Financial Sustainability and Resource Allocation
6. Infrastructure and Technology Integration
7. Community Collaboration and Industry Partnerships

Data collection

Objective 2: To develop strategies to influence the sustainable development of physical education teaching in private colleges in Shaanxi Province. The specific data collection methods and steps are as follows:

Step 1: Use the results of the first phase to formulate a draft research on the sustainable development strategy of physical education teaching in private collegesin Shaanxi Province.

Step 2: The researchers asked the Graduate School of Ban Songde University to write a letter to collect focus group discussion data from 6 physical education teachers, 2 sports administrators, and 3 sports industry experts from 8 private universities in Shaanxi Province.

Step 3: Examine qualitative strategies using interview methods (qualitative research). Focus (focus group interview) to determine the sustainable development strategy of physical education teaching in private colleges in Shaanxi Province, which is a strategic evaluation step. Eleven experts were selected from the target population to participate in the panel discussion.

Data analysis

The researcher conducted data analysis using content analysis. Suggestions from experts were considered to reach a consensus and were used to revise the draft of the strategies to influence the sustainable development of physical education teaching in private colleges in Shaanxi Province.

Stage 3: To evaluate the feasibility and adaptability of strategy for the sustainable development of physical education teaching in private colleges in Shaanxi Province.

The Target Group:

The 5 experts who evaluated the sustainable development strategy of physical education teaching came from Shaanxi International Business and Trade College and Xi'an Peihua College. They have a great influence on the formulation of sustainable development strategy, sustainable development, talent training and education management of physical education teaching in private universities. Expert qualifications: 1) more than 15 years of work experience, 2) senior professional title, 3) senior leadership.

The evaluation form is based on a 5-point Likert scale with four evaluation levels: “highest”, “high”, “medium”, “low” and “lowest”.

Table 3.5 List of experts in the evaluation team

NO	Education Institutions	Assessment Panel experts
1	Shaanxi University of International Trade & Commerce	2
2	Xi'an Peihua University	3
	Total	**5**

Research instrument

Evaluation Form

This instrument collects data for Objective 3 and evaluate the suitability of strategies for the sustainable development of physical education teaching in private colleges in Shaanxi Province. 5 experts from Xi'an Peihua University, and Shaanxi University of International Trade & Commerce, were invited to evaluate the feasibility and adaptability of the strategy. The evaluation form provide into two parts:

Part 1: the personal information of experts classified by work position, work experience, educational background, and academic title.

Part 2: The evaluation form for developing strategies for the sustainable development of physical education teaching in private universities in Shaanxi Province.

The criteria for data interpretation based on a five-point Likert's scale (1932), The data interpretation is as follows:

5 refers to the feasibility and adaptability of the strategies at the highest level

4 refers to the feasibility and adaptability of the strategies at a high level

3 refers to the feasibility and adaptability of the strategies at a medium level

2 refers to the feasibility and adaptability of the strategies at a low level

1 refers to the feasibility and adaptability of the strategies at the lowest level

The process of constructing a evaluation form

1. The researcher used the details of Sustainable Strategy of Physical Education Teaching in Private Colleges in Shaanxi Province as the basis for formulating the questions.

2. The researcher developed a questionnaire to evaluate the feasibility and adaptability of the sustainable development of physical education teaching in private universities in Shaanxi Province, using a 5-point rating scale.

3. The researcher submitted the draft questionnaire for assessing the feasibility and adaptability of the strategies to the thesis advisor and committee chair for review, focusing on appropriateness and language usage.

4. The researcher revised the questionnaire based on feedback from the thesis advisor and committee chair to ensure its feasibility and adaptability for evaluating the strategies.

Data collection

The method of data collection for Aim 3: to evaluate the feasibility and adaptability of the research on sustainable development strategies for physical education teaching in private universities in Shaanxi Province.

The results from the second stage were used to evaluate the research on sustainable development strategies for physical education teaching in private universities in Shaanxi Province. The specific steps are as follows:

Step 1: The researcher requested a letter from the Graduate School of Bansomdejchaopraya Rajabhat University to gather evaluations from 5 experts from Xi'an Peihua College,and Shaanxi Institute of International Trade and Commerce, in order to formulate strategies for the sustainable development of physical education teaching in private universities in Shaanxi Province.

Step 2: The researcher distributed the evaluation forms to the 5 experts, chose an appropriate time and place to contact the experts, instructed them to score the assessment forms, and ensured that a evaluation forms were collected 100%.

Step 3: The researcher Invited experts to fill out the evaluation form.

Step 4: The researcher summarized and analyzed the results of the evaluation form.

Data analysis

Evaluate the feasibility and adaptability of the educational management strategies for suitability of strategies for the sustainable development of physical education teaching in private colleges in Shaanxi Province. using descriptive statistics, the strategies and measures proposed in this study were assessed by means and standard deviations.

The data interpretation for average value is based on Rensis Likert (1932). The data interpretation is as follows:

4.50 - 5.00 expresses the highest level

3.50 - 4.49 expresses high level

2.50 - 3.49 expression medium level

1.50 - 2.49 expresses low level

1.00 - 1.49 expresses the lowest level

Summary of research methods in 3 stages as shown in Figure 3.1

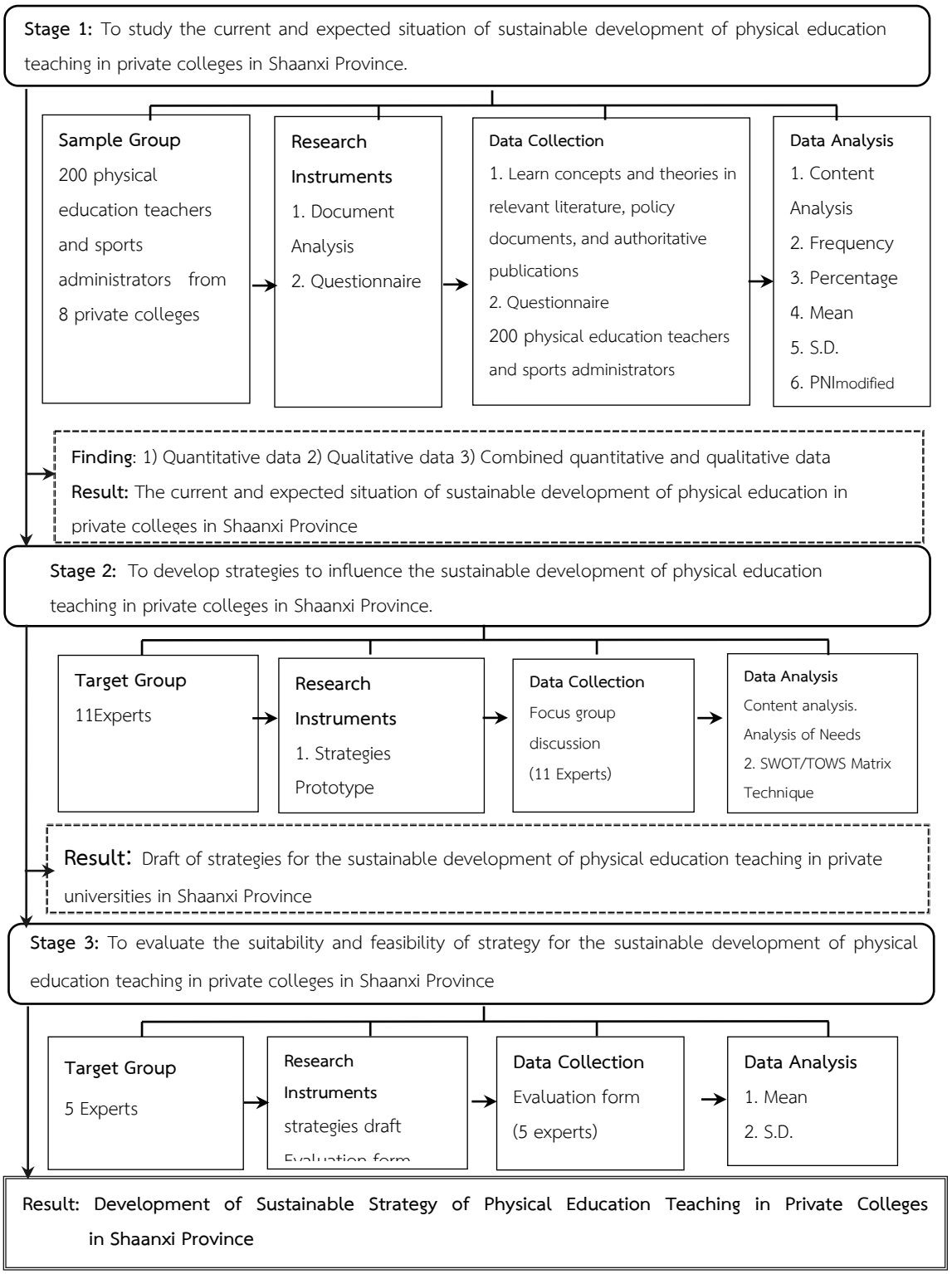

Figure 3.1 Summary of research methods

Chapter 4

Results of Analysis

The presentation of research data analysis on Development of Sustainable Strategy of Physical Education Teaching in Private Colleges in Shaanxi Province is organized as follows:

1. Symbol and Abbreviations
2. Results of data analysis

Symbol and Abbreviations

To ensure a clear understanding of the interpretation of the data analysis, the researcher has defined the meanings of the symbols used in the analysis as follows:

n	refers to the sample size
$\bar{x}$	refers to the average value
S.D.	refers to the standard deviation
$PNI_{Modified}$	refers to the Modified Priority Needs Index
I	refers to the expected condition of the sustainable development of physical education teaching
D	refers to the current condition of the sustainable development of physical education teaching
S	refers to internal components that serve as strengths in the sustainable development of physical education teaching
W	refers to internal components that represent weaknesses in the sustainable development of physical education teaching
O	refers to external components that provide opportunities for the sustainable development of physical education teaching
T	refers to external components that pose threats or challenges to the sustainable development of physical education teaching

Results of data analysis

This chapter presents the results of data analysis related to the research titled Development of Sustainable Strategy of Physical Education Teaching in Private Colleges in Shaanxi Province. The analysis is divided into three stages, as detailed below:

Stage 1: Analysis of the Current and Expected Situations and Priority Needs for the Sustainable Development of Physical Education Teaching in Private Colleges in Shaanxi Province

This stage consists of the following three steps:

1.1 A document review.

1.2 An investigation of the current and expected situations and priority needs for the sustainable development of physical education teaching in private colleges in Shaanxi Province, conducted using a questionnaire.

Stage 2: Development of a Strategies to Influence the Sustainable Development of Physical Education Teaching in Private Colleges in Shaanxi Province.

This stage comprises the following steps:

2.1 Results of analyze the needs, strengths, weaknesses, opportunities, and threats related to the sustainable development of physical education teaching

2.2 SWOT Analysis Based on Internal and External Environmental components of the Development of a Sustainable Strategy for Physical Education Teaching in Private Colleges in Shaanxi Province

2.3 TOWS matrix analysis for the development of a sustainable strategy for physical education teaching in private colleges in Shaanxi Province.

2.4 Drafting the Sustainable Strategy for Physical Education Teaching in Private Colleges in Shaanxi Province

2.5 Refinement of the Strategy through Focus Group Discussion

Stage 3: Evaluation of the feasibility and adaptability of the Developed Strategy

The detailed results of each stage are presented in the following sections.

Stage 1: Analysis of the Current and Expected Situations and Priority Needs for the Sustainable Development of Physical Education Teaching in Private Colleges in Shaanxi Province

Analysis of the current and expected situation and priority needs for sustainable development of Physical Education Teaching in Private Colleges in Shaanxi Province as follows:

1.1 A document review

A review of relevant documents and research studies was conducted to identify the key components of a sustainable strategy for physical education teaching in private colleges in Shaanxi Province. The findings from this analysis revealed that the sustainable strategy consists of seven essential components, as follows:

1. Policy and Governance
2. Curriculum Design and Innovation
3. Faculty Development and Professional Training
4. Student Engagement and Lifelong Learning
5. Financial Sustainability and Resource Allocation
6. Infrastructure and Technology Integration
7. Community Collaboration and Industry Partnerships

Table 4.1 The key components of a sustainable strategy for physical education teach Teaching

Key Component	Description	Resources
1. Policy and Governance	Refer to the provision of institutional assurance and operational support for the sustainable development of physical education through the establishment of a scientifically grounded and coherent policy framework, alongside an efficient and standardised governance mechanism.	Gao, X.F. (2017). Research on the Changes of School Sports Policy in China (1904-2014) PhD (Dissertation, Beijing Sports University). PhD https://link.cnki. net/doi/10.26961/d. cnki. gbjtu.2017.000017 Zhang, W.P. (2015). PhD in Research on the Development and Reform of School Sports Policy in China (Dissertation, Central China Normal University).
2.Curriculum Design and Innovation	refers to the systematic planning of objectives, content, instructional methods, and assessment mechanisms for physical education, based on students' physical and psychological developmental needs, institutional orientation, and the evolving societal demand for sports professionals.	Zhu, W.Q. (2007). PhD in Standard-Based Physical Education Curriculum Design (Dissertation, East China Normal University). Zhang, X.Q. (2007). Doctoral dissertation on the implementation of physical education curriculum PhD, Nanjing Normal University). Yuan, S.H. (2014). Comparative analysis of physical education curriculum programs in China and the United States. Journal of Inner Mongolia Normal University (Educational Science Edition) (07),135-137.

Table 4.1 (Continued)

Key Component	Description	Resources
3.Faculty Development and Professional Training	refers to a systematic, multi-level mechanism aimed at enhancing the professional competence, teaching effectiveness, and developmental capacity of physical education (PE) teachers.	Zhang, H. (2017). PhD in Optimization of Teacher Education Courses in Physical Education (Dissertation, Shanghai Institute of Physical Education). Shao, L.H. (2016). Doctoral research on professional development of physical education teachers in local universities (dissertation, Northeast Normal University). Lv, X. Y. (2022). Professional development of PE teachers in private colleges: Challenges and solutions. Journal of Modern Education Studies, 15(1), 33–40.
4.Student Engagement and Lifelong Learning	refers to the development of a student-centred teaching system designed to foster learners' initiative, enthusiasm, and sustained interest in physical education.	Chen, C. G., & Niu, D. (2001). On college students' participatory learning. Exploration of Higher Education, (4), 59-62. Zhao, L.M. (2002). On student participation. Chinese Journal of Education (4), 4. Du, G. Y. (2014). Strategies for promoting lifelong physical activity among university students. Journal of Sports Education, 36(2), 45–52.
5. Financial Sustainability and Resource Allocation	refers to the capacity of colleges and universities to maintain long-term and stable investment in physical education without reliance on	Hu, T.P. (20 16). Master of Science in the Utilization and Improvement of Sports Venues in Colleges and Universities in Xi'an (Disser-tation, Xi'an Institute of Physical Education)

Table 4.1 (Continued)

Key Component	Description	Resources
	short-term financial subsidies or temporary funding sources.	DONG, D.P. Research on the allocation of public sports resources and its mechanism on residents' well-being[D]. Jilin University, 2019. DOI:10.27162/d.cnki.gjlin.2019.001011 WANG, J. Research on the optimization of resource allocation of public sports facilities in western China under the strategy of sports power[J]. Stationery & Sports Supplies & Technology, 2022, 14:83-85. DOI:10.3969/j.issn.1006-8902.2022.14.029.
6. Infrastructure and Technology Integration	refers to the coordinated use of physical facilities, including sports venues, equipment and instructional spaces, together with modern information technologies such as smart sports platforms, teaching management systems and data analysis tools. This integration aims to enhance the efficiency of physical education teaching and increase student engagement.	Wu, Y.P. (2014). Master of Socialized Management of College Sports Facilities (Dissertation, Jilin University). Li, S.Y. (2014). Master's degree in research on school sports resources serving society under the background of the implementation of the National Fitness Program (Dissertation, Nanjing Normal University). Yuan, Y. (2022). Research on the relationship between smart teaching integrated into sports game courses and student engagement and satisfaction. Science and Education Literature (11), 87-89. doi:10.16871/j.cnki.kjwh.2022.11.026.

Table 4.1 (Continued)

Key Component	Description	Resources
7. Community Collaboration and Industry Partnerships	refers to the coordinated use of physical facilities, including sports venues, equipment and instructional spaces, together with modern information technologies such as smart sports platforms, teaching management systems and data analysis tools.	LIANG, Q.C, SHI, Z.G, LI ,Y. Journal of Xi'an University of Physical Education, 2020(2): 6. DOI: 10. 16063/j.cnki.issn1001-747x.2020.02.009. ZHU, L.C, WU, Y. Journal of Hubei University of Economics, 2023, 21(6):72-85. DOI : 10.3969/ j.issn. 1672-626x.2023.06.006. WANG, L.G. Analysis of sustainable development factors of China's sports industry[J]. SME Management and Technology, 2021.

1.2 An investigation of the current and expected situation and priority needs for the sustainable development of physical education teaching in private colleges in Shaanxi Province, conducted using a questionnaire.

1.2.1 A questionnaire survey was conducted to assess the current situation and the expected future situation of sustainable development in physical education teaching in private colleges in Shaanxi Province. A total of 200 respondents participated in the survey, representing a 100% response rate. The respondents' characteristics were categorized by role, years of experience in physical education or a related field, and type of institution or organization. Details of these respondent characteristics are presented in Table 4.2.

Table 4.2 Analysis of the personal information and participants.

(n=200)

Personal Information		Frequency	Percentage
1. Role	1. Physical Education Teacher	163	81.50
	2. Sports administrators	10	5.00
	3. College Administrator	8	4.00
	4. Sports Specialist	9	4.50
	5. Course Leader	10	5.00
	Total	**200**	**100.00**
2. Years of Experience in Physical Education or Related Field:	1. Less than 1 year	6	3.00
	2. 1-5 years	41	20.00
	3. 6-10 years	55	28.00
	4. More than 10 years	98	49.00
	Total	**200**	**100.00**
3. Institution/ Organization Type	1. Private College	190	95.00
	2. Government Agency	4	2.00
	3. Private Sector	6	3.00
	4. NGO/Sports Federation	0	0.00
	5. Other (Please specify	0	0.00
	Total	**200**	**100.00**

Based on Table 4.2, the study found that among the 200 respondents, the largest group consisted of physical education teachers (163 individuals, 81.5%). Most respondents had more than 10 years of experience (98 individuals, 49%), followed by those with 6–10 years of experience (55 individuals, 28%). The majority of respondents were affiliated with private colleges (190 individuals, 95%).

1.2.2 The current and expected situation and priority needs for sustainable development of physical education teaching in private colleges in Shaanxi Province

The results of the analysis of the current and expected situation and priority needs regarding the sustainable development of physical education teaching in private colleges in Shaanxi Province are presented in Tables 4.3 to 4.9.

Table 4.3 Current Situation, Expected Situation, and Priority Needs in the Area of Policy and Governance

The sustainable development of physical education teaching	Current Situation (D)			Expected condition (I)			PNI	Rank
	$\bar{x}$	S.D.	Level	$\bar{x}$	S.D.	Level		
1. Policy and Governance								
1.1 Current policies effectively support sustainable physical education (PE) teaching in private colleges.	4.34	0.69	high	4.60	0.65	highest	0.06	5
1.2 Institutional policies provide clear guidance for PE curriculum development and teacher training.	3.31	0.53	moderate	4.66	0.50	highest	0.41	2*
1.3 The government plays an effective role in ensuring PE teaching quality in private colleges.	3.20	0.58	high	4.63	0.50	highest	0.45	1*
1.4 The school has formulated a clear plan for the development of physical education.	4.04	0.75	high	4.65	0.53	highest	0.15	4
1.5 The school regularly evaluates the effectiveness of the implementation of the physical education policy.	3.55	0.87	high	4.58	0.65	high	0.29	3*
Overall	**3.60**	**0.68**	**high**	**4.60**	**0.57**	**highest**	**0.27**	

From Table 4.3, it was found that the overall current situation was at a high level ($\bar{X}$=3.60). The item with the highest mean score was “Current policies effectively support sustainable physical education (PE) teaching in private colleges” ($\bar{X}$=4.34), followed by “The school has formulated a clear plan for the development of physical education” ($\bar{X}$=4.04). The item with the lowest mean score was “The government plays an effective role in ensuring PE teaching quality in private colleges” ($\bar{X}$=3.20).

The overall expected situation was at the highest level. The item with the highest mean score was “Institutional policies provide clear guidance for PE curriculum development and teacher training” ($\bar{X}$=4.66), followed by “The school has formulated a clear plan for the development of physical education” ($\bar{X}$=4.65). The item with the lowest mean score was “The school regularly evaluates the effectiveness of the implementation of the physical education policy” ($\bar{X}$=4.58).

Regarding priority needs, the item with the highest PNImodified value was “The government plays an effective role in ensuring PE teaching quality in private colleges” ($PNI_{modified}$=0.45), followed by “Institutional policies provide clear guidance for PE curriculum development and teacher training” ($PNI_{modified}$=0.41). The item identified as the greatest strength was “Current policies effectively support sustainable physical education (PE) teaching in private colleges” ($PNI_{modified}$=0.06).

Table 4.4 Current Situation, Expected Situation, and Priority Needs in the Area of Curriculum Design and Innovation.

The sustainable development of physical education teaching	Current Situation (D)			Expected condition (I)			PNI	Rank
	$\bar{x}$	S.D.	Level	$\bar{x}$	S.D.	Level		
2. Curriculum Design and Innovation.								
2.1 The current PE curriculum is relevant to students' physical and mental well-being.	4.05	0.72	high	4.63	0.53	highest	0.14	5
2.2 Sustainability and lifelong fitness education are well incorporated into the curriculum.	3.28	0.81	moderate	4.62	0.53	highest	0.41	2*
2.3 Digital learning tools (e.g., fitness apps, virtual PE classes) are well integrated into teaching.	3.80	1.07	high	4.68	0.48	highest	0.23	3*
2.4 The PE curriculum is frequently updated to align with technological advancements.	4.18	0.75	high	4.79	0.42	highest	0.15	4
2.5 The curriculum supports long-term student engagement in physical activity.	3.34	0.94	moderate	4.79	0.42	highest	0.43	1*
Overall	**3.73**	**0.86**	**high**	**4.70**	**0.48**	**highest**	**0.27**	

From Table 4.4, it was found that the overall current situation was at a high level ($\bar{x}$=3.73). The item with the highest mean score was “The PE curriculum is frequently updated to align with technological advancements” ($\bar{x}$=4.18), followed by “The current PE curriculum is relevant to students' physical and mental well-being” ($\bar{x}$=4.05). The item with the lowest mean score was “Sustainability and lifelong fitness education are well incorporated into the curriculum” ($\bar{x}$=3.28).

The overall expected situation was at the highest level ($\bar{x}$=4.70). The item with the highest mean score was a tie between “The PE curriculum is frequently updated to align with technological advancements” and “The curriculum supports long-term student engagement in physical activity” ($\bar{x}$=4.79), followed by “Digital learning tools (e.g., fitness apps, virtual PE classes) are well integrated into teaching” ($\bar{x}$=4.68). The item with the lowest mean score, once again, was “Sustainability and lifelong fitness education are well incorporated into the curriculum” ($\bar{x}$=4.62).

Regarding priority needs, the item with the highest $PNI_{modified}$ value was “The curriculum supports long-term student engagement in physical activity” ($PNI_{modified}$=0.43), followed by “Sustainability and lifelong fitness education are well incorporated into the curriculum” ($PNI_{modified}$=0.41). The item identified as the greatest strength was “The current PE curriculum is relevant to students' physical and mental well-being” ($PNI_{modified}$=0.14).

Table 4.5 Current Situation, Expected Situation, and Priority Needs in the Area of Faculty Development and Professional Training.

The sustainable development of physical education teaching	Current Situation (D)			Expected condition (I)			PNI	Rank
	$\bar{x}$	S.D.	Level	$\bar{x}$	S.D.	Level		
3. Faculty Development and Professional Training.								
3.1 PE teachers receive frequent training on modern teaching methods and technologies.	4.18	0.76	high	4.75	0.51	highest	0.14	4
3.2 PE teachers are well trained in integrating sustainability concepts into teaching.	3.82	1.09	high	4.63	0.55	highest	0.21	3*
3.3 Faculty members often participate in off-campus academic exchanges.	3.74	0.97	high	4.13	0.76	high	0.10	5
3.4 Faculty development significantly contributes to the overall quality of PE education.	3.86	1.05	high	4.76	0.50	highest	0.23	2*
3.5 Current teaching methodologies effectively engage students.	3.75	1.00	high	4.79	0.42	highest	0.28	1*
Overall	**3.87**	**0.97**	**high**	**4.61**	**0.55**	**highest**	**0.19**	

From Table 4.5, it was found that the overall current situation was at a high level ($\bar{X}$=3.87). The item with the highest mean score was “PE teachers receive frequent training on modern teaching methods and technologies” ($\bar{X}$=4.18), followed by “Faculty development significantly contributes to the overall quality of PE education” ($\bar{X}$=3.86). The item with the lowest mean score was “Faculty members often participate in off-campus academic exchanges” ($\bar{X}$=3.74).

The overall expected situation was at the highest level ($\bar{X}$=4.61). The item with the highest mean score was “Current teaching methodologies effectively engage students” ($\bar{X}$=4.79), followed by “Faculty development significantly contributes to the overall quality of PE education” ($\bar{X}$=4.76), and “PE teachers receive frequent training on modern teaching methods and technologies” ($\bar{X}$=4.75). The item with the lowest mean score was again “Faculty members often participate in off-campus academic exchanges” ($\bar{X}$=4.10).

Regarding priority needs, the item with the highest $PNI_{modified}$ value was “Current teaching methodologies effectively engage students” ($PNI_{modified}$=0.28), followed by “Faculty development significantly contributes to the overall quality of PE education” ($PNI_{modified}$=0.23). The item considered the greatest strength was “Faculty members often participate in off-campus academic exchanges” ($PNI_{modified}$=0.10).

Table 4.6 Current Situation, Expected Situation, and Priority Needs in the Area of Student Engagement and Lifelong Learning

The sustainable development of physical education teaching	Current Situation (D)			Expected condition (I)			PNI	Rank
	$\bar{x}$	S.D.	Level	$\bar{x}$	S.D.	Level		
4. Student Engagement and Lifelong Learning								
4.1 Students show high interest in PE classes and extracurricular sports activities.	3.46	1.13	moderate	4.29	0.46	high	0.24	3*
4.2 Current teaching methods effectively promote lifelong fitness habits.	3.85	1.04	high	4.58	0.52	highest	0.19	4
4.3 There are sufficient extracurricular sports activities to keep students engaged.	2.44	0.98	low	4.76	0.44	highest	0.95	1*
4.4 Students recognize the importance of PE for their overall well-being	4.11	0.80	high	4.80	0.40	highest	0.17	5
4.5 The PE program prepares students well for independent lifelong fitness.	3.46	1.13	moderate	4.79	0.42	highest	0.38	2*
Overall	**3.46**	**1.02**	**moderate**	**4.64**	**0.45**	**highest**	**0.39**	

From Table 4.6, it was found that the overall current situation was at a moderate level ($\bar{x}$=3.46). The item with the highest mean score was “Students recognize the importance of PE for their overall well-being” ($\bar{x}$=4.11), followed by “Current teaching methods effectively promote lifelong fitness habits” ($\bar{x}$=3.85). The item with the lowest mean score was “There are sufficient extracurricular sports activities to keep students engaged” ($\bar{x}$=2.44).

The overall expected situation was at the highest level ($\bar{x}$=4.64). The item with the highest mean score was “Students recognize the importance of PE for their overall well-being” ($\bar{x}$=4.80), followed by “The PE program prepares students well for independent lifelong fitness” ($\bar{x}$=4.79). The third-highest mean score was “There are sufficient extracurricular sports activities to keep students engaged” ($\bar{x}$=4.76), while the item with the lowest mean score was “Students show high interest in PE classes and extracurricular sports activities” ($\bar{x}$=4.29).

Regarding priority needs, the item with the highest $PNI_{modified}$ value was “There are sufficient extracurricular sports activities to keep students engaged” ($PNI_{modified}$=0.95), followed by “The PE program prepares students well for independent lifelong fitness” ($PNI_{modified}$=0.38). The item identified as the greatest strength was “Students recognize the importance of PE for their overall well-being” ($PNI_{modified}$=0.17).

Table 4.7 Current Situation, Expected Situation, and Priority Needs in the Area of Financial Sustainability and Resource Allocation

The sustainable development of physical education teaching	Current Situation (D)			Expected condition (I)			PNI	Rank
	$\bar{x}$	S.D.	Level	$\bar{x}$	S.D.	Level		
5. Financial Sustainability and Resource Allocation								
5.1 Funding for PE teaching in private colleges is adequate.	2.99	1.14	moderate	4.95	0.23	Highest	0.66	3*
5.2 Financial support effectively covers PE program needs, such as equipment and facilities.	2.66	0.72	moderate	4.75	0.47	Highest	0.79	2*
5.3 Funds are well allocated for PE faculty development and training.	2.43	0.98	low	4.95	0.22	Highest	1.04	1*
5.4 Financial challenges significantly affect the sustainability of PE teaching.	4.24	0.80	high	4.77	0.42	Highest	0.13	4
5.5 Alternative funding models could be explored to support PE education.	4.69	0.64	highest	4.76	0.43	Highest	0.01	5
Overall	**3.40**	**0.86**	**moderate**	**4.84**	**0.35**	**Highest**	**0.53**	

From Table 4.7, it was found that the overall current situation was at a moderate level ($\bar{x}$=3.40). The item with the highest mean score was “Alternative funding models could be explored to support PE education” ($\bar{x}$=4.69), followed by “Financial challenges significantly affect the sustainability of PE teaching” ($\bar{x}$=4.64). The item with the lowest mean score was “Funds are well allocated for PE faculty development and training” ($\bar{x}$=2.43).

The overall expected situation was at the highest level ($\bar{x}$=4.84). The item with the highest mean score was a tie between “Funding for PE teaching in private colleges is adequate” and “Funds are well allocated for PE faculty development and training” ($\bar{x}$=4.95), followed by “Financial challenges significantly affect the sustainability of PE teaching” ($\bar{x}$=4.77). The third-highest mean score was “Alternative funding models could be explored to support PE education” ($\bar{x}$=4.76), while the item with the lowest mean score was “Financial support effectively covers PE program needs, such as equipment and facilities” ($\bar{x}$=4.75).

Regarding priority needs, the item with the highest $PNI_{modified}$ value was “Funds are well allocated for PE faculty development and training” ($PNI_{modified}$=1.04), followed by “Financial support effectively covers PE program needs, such as equipment and facilities”($PNI_{modified}$=0.79). The item identified as the greatest strength was “Alternative funding models could be explored to support PE education” ($PNI_{modified}$=0.01).

Table 4.8 Current Situation, Expected Situation, and Priority Needs in the Area of Infrastructure and Technology Integration

The sustainable development of physical education teaching	Current Situation (D)			Expected condition (I)			PNI	Rank
	$\bar{x}$	S.D.	Level	$\bar{x}$	S.D.	Level		
6. Infrastructure and Technology Integration								
6.1 Sports facilities for PE teaching in private colleges are sufficient.	2.67	1.25	moderate	4.80	0.40	Highest	0.80	1*
6.2 Modern sports technologies are well integrated into the PE curriculum.	3.16	0.78	moderate	4.68	0.47	Highest	0.48	3*
6.3 Sports facilities are frequently upgraded and well maintained.	2.81	0.99	moderate	4.66	0.53	Highest	0.66	2*
6.4 Smart fitness devices and AI-driven tools effectively support PE learning.	4.12	0.83	high	4.63	0.54	Highest	0.12	5
6.5 Technological innovations enhance the effectiveness of PE teaching.	3.90	1.15	high	4.64	0.54	Highest	0.19	4
Overall	**3.33**	**1.00**	**moderate**	**4.68**	**0.49**	**Highest**	**0.45**	

From Table 4.8, it was found that the overall current situation was at a moderate level ($\bar{x}$=3.33). The item with the highest mean score was “Smart fitness devices and AI-driven tools effectively support PE learning” ($\bar{x}$=4.12), followed by “Technological innovations enhance the effectiveness of PE teaching” ($\bar{x}$=3.90). The item with the lowest mean score was “Sports facilities for PE teaching in private colleges are sufficient” ($\bar{x}$=2.67).

The overall expected situation was at the highest level ($\bar{x}$=4.68). The item with the highest mean score was “Sports facilities for PE teaching in private colleges are sufficient” ($\bar{x}$=4.80), followed by “Modern sports technologies are well integrated into the PE curriculum” ($\bar{x}$=4.68). The third-highest mean score was “Sports facilities are frequently upgraded and well maintained” ($\bar{x}$=4.66), while the item with the lowest mean score was “Smart fitness devices and AI-driven tools effectively support PE learning” ($\bar{x}$=4.63).

Regarding priority needs, the item with the highest $PNI_{modified}$ value was “Sports facilities for PE teaching in private colleges are sufficient” ($PNI_{modified}$=0.80), followed by “Sports facilities are frequently upgraded and well maintained” ($PNI_{modified}$=0.66). The item identified as the greatest strength was “Smart fitness devices and AI-driven tools effectively support PE learning” ($PNI_{modified}$=0.12).

Table 4.9 Current Situation, Expected Situation, and Priority Needs in the Area of Community Collaboration and Industry Partnerships

The sustainable development of physical education teaching	Current Situation (D)			Expected condition (I)			PNI	Rank
	$\bar{x}$	S.D.	Level	$\bar{x}$	S.D.	Level		
7. Community Collaboration and Industry Partnerships								
7.1 Students are offered internships or training opportunities to work in professional sports organizations.	3.15	1.24	moderate	4.95	0.23	Highest	0.57	2*
7.2 Universities frequently organize community-based sports programs.	2.39	0.59	low	4.67	0.48	Highest	0.96	1*
7.3 Community collaboration should be improved to enhance PE sustainability.	3.91	1.14	high	4.69	0.46	Highest	0.20	4
7.4 The role of community cooperation in enhancing the social influence of physical education teaching.	4.09	0.91	high	4.65	0.48	Highest	0.14	5
7.5 Private colleges collaborate effectively with local sports clubs and community organizations.	3.21	0.82	moderate	4.67	0.50	Highest	0.45	3*
Overall	**3.35**	**0.94**	**moderate**	**4.72**	**0.43**	**Highest**	**0.46**	

From Table 4.9, it was found that the overall current situation was at a moderate level ($\bar{x}$=3.35). The item with the highest mean score was “The role of community cooperation in enhancing the social influence of physical education teaching” ($\bar{x}$=4.09), followed by “Community collaboration should be improved to enhance PE sustainability” ($\bar{x}$=3.91). The item with the lowest mean score was “Universities frequently organize community-based sports programs” ($\bar{x}$=2.39).

The overall expected situation was at the highest level ($\bar{x}$=4.72). The item with the highest mean score was “Students are offered internships or training opportunities to work in professional sports organizations” ($\bar{x}$=4.95), followed by “Community collaboration should be improved to enhance PE sustainability” ($\bar{x}$=4.69). The third-highest mean score was shared by “Universities frequently organize community-based sports programs” and “Private colleges collaborate effectively with local sports clubs and community organizations” ($\bar{x}$=4.67). The item with the lowest mean score was “The role of community cooperation in enhancing the social influence of physical education teaching” ($\bar{x}$=4.65).

Regarding priority needs, the item with the highest $PNI_{modified}$ value was “Universities frequently organize community-based sports programs” ($PNI_{modified}$=0.96), followed by “Students are offered internships or training opportunities to work in professional sports organizations” ($PNI_{modified}$=0.57). The item identified as the greatest strength was “The role of community cooperation in enhancing the social influence of physical education teaching” ($PNI_{modified}$=0.14).

The results for the first research question, “What are the current and expected situations of the sustainable development of physical education teaching in private colleges in Shaanxi Province?” are presented in Table 4.10.

Table 4.10 Overall Current Situation, Expected Situation, and Priority Needs for the Sustainable Development of Physical Education Teaching in Private Colleges in Shaanxi Province

The sustainable development of physical education teaching	Current Situation (D)			Expected condition (I)			PNI	Rank
	$\bar{x}$	S.D.	Level	$\bar{x}$	S.D.	Level		
1. Policy and Governance	3.60	0.68	high	4.60	0.57	highest	0.26	6
2. Curriculum Design and Innovation.	3.73	0.86	high	4.70	0.48	highest	0.43	4
3. Faculty Development and Professional Training	3.79	0.97	high	4.61	0.55	highest	0.19	7
4. Student Engagement and Lifelong Learning	3.46	1.02	moderate	4.64	0.45	highest	0.39	5
5. Financial Sustainability and Resource Allocation	3.40	0.86	moderate	4.84	0.35	Highest	0.52	1*
6. Infrastructure and Technology Integration	3.33	1	moderate	4.68	0.49	Highest	0.45	3*
7. Community Collaboration and Industry Partnerships	3.35	0.94	moderate	4.72	0.43	Highest	0.46	2*
Overall	**3.52**	**0.90**	**High**	**4.68**	**0.47**	**Highest**	**0.38**	

According to Table 4.10, this study examined the current and expected situations of the sustainable development of physical education teaching in private colleges in Shaanxi Province, as influenced by seven key components:

1. Policy and Governance
2. Curriculum Design and Innovation
3. Faculty Development and Professional Training

4. Student Engagement and Lifelong Learning

5. Financial Sustainability and Resource Allocation

6. Infrastructure and Technology Integration

7. Community Collaboration and Industry Partnerships.

The current situation of physical education teaching was rated at a high level, with an overall mean score of 3.52. The component with the highest mean score was Faculty Development and Professional Training ($\bar{X}$=3.79), followed by Curriculum Design and Innovation ($\bar{X}$=3.73). In contrast, the component with the lowest mean score was Infrastructure and Technology Integration ($\bar{X}$=3.33).

The expected situation was rated at the highest level, with an overall mean score of 4.68. The component with the highest mean score was Financial Sustainability and Resource Allocation ($\bar{X}$=4.84), followed by Community Collaboration and Industry Partnerships ($\bar{X}$=4.72). In contrast, the component with the lowest mean score was Policy and Governance ($\bar{X}$=4.60).

The Priority Needs Index Modified ($PNI_{modified}$) for the sustainable development of physical education teaching was calculated at 0.38. The component with the highest $PNI_{modified}$ value was Financial Sustainability and Resource Allocation ($PNI_{modified}$=0.52), followed by Community Collaboration and Industry Partnerships ($PNI_{modified}$=0.46). The component with the lowest $PNI_{modified}$ value was Faculty Development and Professional Training ($PNI_{modified}$=0.19).

Based on the analysis of the current and expected situations, as well as the prioritization of needs, the $PNI_{modified}$ values were used to determine the levels of need. These values were categorized into two groups: components with high $PNI_{modified}$ values and those with low $PNI_{modified}$ values.

Components with high $PNI_{modified}$ values were interpreted as weaknesses if they represented internal components, or as threats if they reflected external components. These issues require attention and improvement, and they serve as a foundation for developing strategies to address or mitigate their negative impact.

In contrast, components with low $PNI_{modified}$ values were considered strengths when classified as internal components, or as opportunities when they were external.

These findings provide a basis for formulating strategies that leverage existing advantages to further enhance the sustainable development of physical education teaching in private colleges in Shaanxi Province.

The results of this analysis were synthesized and utilized as input for drafting strategic recommendations in the next phase of the study.

1.2.3 The results of the respondents' opinions were analysed to classify the external environment and identify questionnaire items that represent external factors influencing the sustainable development of physical education teaching in private colleges in Shaanxi Province. The findings are summarised in Table 4.11.

Table 4.11 Summary of the analysis of questionnaire items related to external factors.

Question Item	Number of Respondents	
	Frequency	Percentage
1. Policy and Governance		
1.1 Current policies effectively support sustainable physical education (PE) teaching in private colleges.	127	63.50
1.2 The government plays an effective role in ensuring PE teaching quality in private colleges.	164	82.00
2. Financial Sustainability and Resource Allocation		
2.1 Funding for PE teaching in private colleges is adequate.	157	78.50
2.2 Financial challenges significantly affect the sustainability of PE teaching.	170	85.00
2.3 Alternative funding models could be explored to support PE education.	141	70.51
3. Infrastructure and Technology Integration		
3.1 Smart fitness devices and AI-driven tools effectively support PE learning.	174	87.00

Table 4.11 (Continued)

Question Item	Number of Respondents	
	Frequency	Percentage
3.1 Technological innovations enhance the effectiveness of PE teaching.	154	77.00
4. Community Collaboration and Industry Partnerships		
4.1 Students are offered internships or training opportunities to work in professional sports organizations.	176	88.00
4.2 Universities frequently organize community-based sports programs.	147	73.50
4.3 Community collaboration should be improved to enhance PE sustainability.	185	92.50
4.4 The role of community cooperation in enhancing the social influence of physical education teaching.	154	77.00
4.5 Private colleges collaborate effectively with local sports clubs and community organizations.	167	83.50

According to Table 4.11, a maximum of 185 out of 200 respondents answered the open-ended question, representing 92.50 per cent. A total of 12 questionnaire items were identified by 60 per cent or more of the respondents as being influenced by external factors. These items are presented below in descending order based on the percentage of responses:

1. Item 7.3 – Community collaboration should be improved to enhance PE sustainability. (92.50%)

2. Item 7.1 – Students are offered internships or training opportunities to work in professional sports organisations. (88.00%)

3. Item 6.4 – Smart fitness devices and AI-driven tools effectively support PE learning. (87.00%)

4. Item 5.4 – Financial challenges significantly affect the sustainability of PE teaching. (85.00%)

5. Item 7.5 – Private colleges collaborate effectively with local sports clubs and community organisations. (83.50%)

6. Item 1.3 – The government plays an effective role in ensuring PE teaching quality in private colleges. (82.00%)

7. Item 5.1 – Funding for PE teaching in private colleges is adequate. (78.50%)

8. Item 6.5 – Technological innovations enhance the effectiveness of PE teaching. (77.00%)

9. Item 7.4 – The role of community cooperation in enhancing the social influence of physical education teaching. (77.00%)

10. Item 7.2 – Universities frequently organise community-based sports programmes. (73.50%)

11. Item 5.5 – Alternative funding models could be explored to support PE education. (70.51%)

12. Item 1.1 – Current policies effectively support sustainable physical education (PE) teaching in private colleges. (63.50%)

Stage 2: Results of the Development strategies to influence the sustainable development of physical education teaching in private colleges in Shaanxi Province.

2.1 Results of analyze the needs, strengths, weaknesses, opportunities, and threats related to the sustainable development of physical education teaching in private colleges in Shaanxi Province.

Results of the Needs and Environmental Analysis for the Development of a Sustainable Strategy for Physical Education Teaching in Private Colleges in Shaanxi Province

A needs and environmental analysis was conducted to support the development of a sustainable strategy for physical education teaching in private colleges in Shaanxi Province. The detailed results of this analysis are presented in Tables 4.12 to 4.18.

Table 4.12 Needs and Environmental Analysis for Developing a Sustainable Strategy in Physical Education Teaching: Policy and Governance

The sustainable development of physical education teaching	Overall		Internal		External	
	PNI	Rank	S	W	O	T
1. Policy and Governance						
1.1 Current policies effectively support sustainable physical education (PE) teaching in private colleges.	0.06	5			✓	
1.2 Institutional policies provide clear guidance for PE curriculum development and teacher training.	0.41	2		✓		
1.3 The government plays an effective role in ensuring PE teaching quality in private colleges.	0.45	1				✓
1.4 The school has formulated a clear plan for the development of physical education.	0.15	4	✓			
1.5 The school regularly evaluates the effectiveness of the implementation of the physical education policy.	0.29	3		✓		
Overall	**0.27**					

According to Table 4.12, the priority needs in the area of Policy and Governance can be categorized into strengths, weaknesses, opportunities, and threats based on the modified Priority Needs Index (PNImodified = 0.27). The findings are as follows:

Strengths

1.4 The school has formulated a clear plan for the development of physical education.

Weaknesses

1.2 Institutional policies provide clear guidance for PE curriculum development and teacher training.

1.5 The school regularly evaluates the effectiveness of the implementation of the physical education policy.

Opportunities

1.1 Current policies effectively support sustainable physical education (PE) teaching in private colleges.

Threats.

1.3 The government plays an effective role in ensuring PE teaching quality in private colleges.

Table 4.13 Needs and Environmental Analysis for Developing a Sustainable Strategy in Physical Education Teaching: Curriculum Design and Innovation

The sustainable development of physical education teaching	Overall		Internal		External	
	PNI	Rank	S	W	O	T
2. Curriculum Design and Innovation.						
2.1 The current PE curriculum is relevant to students' physical and mental well-being.	0.14	5	✓			
2.2 Sustainability and lifelong fitness education are well incorporated into the curriculum.	0.41	2		✓		
2.3 Digital learning tools (e.g., fitness apps, virtual PE classes) are well integrated into teaching.	0.23	3	✓			
2.4 The PE curriculum is frequently updated to align with technological advancements.	0.15	4	✓			
2.5 The curriculum supports long-term student engagement in physical activity.	0.43	1		✓		
Overall	**0.27**					

According to Table 4.13, the priority needs in the area of Curriculum Design and Innovation can be categorized into strengths, weaknesses, opportunities, and threats based on the modified Priority Needs Index (PNImodified= 0.27). The findings are as follows:

Strengths

2.1 The current PE curriculum is relevant to students' physical and mental well-being.

2.3 Digital learning tools (e.g., fitness apps, virtual PE classes) are well integrated into teaching.

2.4 The PE curriculum is frequently updated to align with technological advancements.

Weaknesses

2.5 The curriculum supports long-term student engagement in physical activity.

2.2 Sustainability and lifelong fitness education are well incorporated into the curriculum.

Table 4.14 Needs and Environmental Analysis for Developing a Sustainable Strategy in Physical Education Teaching: Faculty Development and Professional Training.

The sustainable development of physical education teaching	Overall		Internal		External	
	PNI	Rank	S	W	O	T
3. Faculty Development and Professional Training.						
3.1 PE teachers receive frequent training on modern teaching methods and technologies.	0.14	4	✓			
3.2 PE teachers are well trained in integrating sustainability concepts into teaching.	0.21	3		✓		

Table 4.14 (Continued)

The sustainable development of physical education teaching	Overall		Internal		External	
	PNI	Rank	S	W	O	T
3.3 Faculty members often participate in off-campus academic exchanges.	0.10	5	✓			
3.4 Faculty development significantly contributes to the overall quality of PE education.	0.23	2		✓		
3.5 Current teaching methodologies effectively engage students.	0.28	1		✓		
Overall	**0.19**					

According to Table 4.14, the needs in the area of Faculty Development and Professional Training. can be classified into strengths, weaknesses, opportunities, and threats based on the average Priority Needs Index Modified ($PNI_{Modified}$=0.19). The analysis revealed the following:

Strengths

3.3 Faculty members often participate in off-campus academic exchanges.

3.1 PE teachers receive frequent training on modern teaching methods and technologies.

Weaknesses

3.5 Current teaching methodologies effectively engage students.

3.4 Faculty development significantly contributes to the overall quality of PE education.

3.2 PE teachers are well trained in integrating sustainability concepts into teaching.

Table 4.15 Needs and Environmental Analysis for Developing a Sustainable Strategy in Physical Education Teaching: Student Engagement and Lifelong Learning

The sustainable development of physical education teaching	Overall		Internal		External	
	PNI	Rank	S	W	O	T
4. Student Engagement and Lifelong Learning.						
4.1 Students show high interest in PE classes and extracurricular sports activities.	0.24	3	✓			
4.2 Current teaching methods effectively promote lifelong fitness habits.	0.19	4	✓			
4.3 There are sufficient extracurricular sports activities to keep students engaged.	0.95	1		✓		
4.4 Students recognize the importance of PE for their overall well-being	0.17	5	✓			
4.5 The PE program prepares students well for independent lifelong fitness.	0.38	2	✓			
Overall	**0.39**					

According to Table 4.15, the priority needs in the area of Student Engagement and Lifelong Learning can be categorized into strengths, weaknesses, opportunities, and threats based on the modified Priority Needs Index ($PNI_{modified}$=0.39). The findings are as follows:

Strengths

4.4 Students recognize the importance of PE for their overall well-being

4.2 Current teaching methods effectively promote lifelong fitness habits.

4.1 Students show high interest in PE classes and extracurricular sports activities.

4.5 The PE program prepares students well for independent lifelong fitness.

Weaknesses

4.3 There are sufficient extracurricular sports activities to keep students engaged.

Table 4.16 Needs and Environmental Analysis for Developing a Sustainable Strategy in Physical Education Teaching: Financial Sustainability and Resource Allocation

The sustainable development of physical education teaching	Overall		Internal		External	
	PNI	Rank	S	W	O	T
5. Financial Sustainability and Resource Allocation						
5.1 Funding for PE teaching in private colleges is adequate.	0.66	3				✓
5.2 Financial support effectively covers PE program needs, such as equipment and facilities.	0.79	2		✓		
5.3 Funds are well allocated for PE faculty development and training.	1.04	1	✓			
5.4 Financial challenges significantly affect the sustainability of PE teaching.	0.13	4			✓	
5.5 Alternative funding models could be explored to support PE education.	0.01	5			✓	
Overall	**0.53**					

According to Table 4.16, the priority needs in the area of Financial Sustainability and Resource Allocation can be categorized into strengths, weaknesses, opportunities, and threats based on the modified Priority Needs Index ($PNI_{modified}$ = 0.53). The findings are as follows:

Strengths

5.3 Funds are well allocated for PE faculty development and training.

Weaknesses

5.2 Financial support effectively covers PE program needs, such as equipment and facilities.

Opportunities

5.5 Alternative funding models could be explored to support PE education.

5.4 Financial challenges significantly affect the sustainability of PE teaching.

Threats.

5.1 Funding for PE teaching in private colleges is adequate.

Table 4.17 Needs and Environmental Analysis for Developing a Sustainable Strategy in Physical Education Teaching: Infrastructure and Technology Integration

The sustainable development of physical education teaching	Overall		Internal		External	
	PNI	Rank	S	W	O	T
6. Infrastructure and Technology Integration						
6.1 Sports facilities for PE teaching in private colleges are sufficient.	0.80	1		✓		
6.2 Modern sports technologies are well integrated into the PE curriculum.	0.48	3		✓		
6.3 Sports facilities are frequently upgraded and well maintained.	0.66	2		✓		
6.4 Smart fitness devices and AI-driven tools effectively support PE learning.	0.12	5			✓	
6.5 Technological innovations enhance the effectiveness of PE teaching.	0.19	4			✓	
Overall	**0.45**					

According to Table 4.17, the priority needs in the area of Infrastructure and Technology Integration can be categorized into strengths, weaknesses, opportunities, and threats based on the modified Priority Needs Index (PNImodified = 0.45). The findings are as follows:

Weaknesses

6.1 Sports facilities for PE teaching in private colleges are sufficient.

6.3 Sports facilities are frequently upgraded and well maintained.

6.2 Modern sports technologies are well integrated into the PE curriculum.

Opportunities

6.4 Smart fitness devices and AI-driven tools effectively support PE learning.

6.5 Technological innovations enhance the effectiveness of PE teaching.

Table 4.18 Needs and Environmental Analysis for Developing a Sustainable Strategy in Physical Education Teaching: Community Collaboration and Industry Partnerships

The sustainable development of physical education teaching	Overall		Internal		External	
	PNI	Rank	S	W	O	T
7.Community Collaboration and Industry Partnerships						
7.1 Students are offered internships or training opportunities to work in professional sports organizations.	0.57	2				✓
7.2 Universities frequently organize community-based sports programs.	0.96	1				✓
7.3 Community collaboration should be improved to enhance PE sustainability.	0.20	4			✓	
7.4 The role of community cooperation in enhancing the social influence of physical education teaching.	0.14	5			✓	

Table 4.18 (Continued)

The sustainable development of physical education teaching	Overall		Internal		External	
	PNI	Rank	S	W	O	T
7.5 Private colleges collaborate effectively with local sports clubs and community organizations.	0.45	3				✓
Overall	**0.46**					

According to Table 4.18, the priority needs in the area of Community Collaboration and Industry Partnerships can be categorized into strengths, weaknesses, opportunities, and threats based on the modified Priority Needs Index ($PN_{Imodified}$ = 0.46). The findings are as follows:

Opportunities

7.4 The role of community cooperation in enhancing the social influence of physical education teaching.

7.3 Community collaboration should be improved to enhance PE sustainability.

Threats.

7.2 Universities frequently organize community-based sports programs.

7.1 Students are offered internships or training opportunities to work in professional sports organizations.

7.5 Private colleges collaborate effectively with local sports clubs and community organizations.

2.2 SWOT Analysis Based on Internal and External Environmental components of the Development of a Sustainable Strategy for Physical Education Teaching in Private Colleges in Shaanxi Province

The analysis of strengths, weaknesses, opportunities, and threats (SWOT), based on internal and external environmental components related to the development of a sustainable strategy for physical education teaching in private colleges in Shaanxi Province, is presented in detail in Table 4.19.

Table 4.19 SWOT Analysis of the Development of a Sustainable Strategy for Physical Education Teaching in Private Colleges in Shaanxi Province

SWOT / FACTOR	Strengths (S)	Weaknesses (W)	Opportunities (O)	Threats (T)
1. Policy and Governance	1.4 The school has formulated a clear plan for the development of physical education.	1.2 Institutional policies provide clear guidance for PE curriculum development and teacher training. 1.5 The school regularly evaluates the effectiveness of the implementation of the physical education policy.	1.1 Current policies effectively support sustainable physical education (PE) teaching in private colleges.	1.3 The government plays an effective role in ensuring PE teaching quality in private colleges.

Table 4.19 (Continued)

SWOT / FACTOR	Strengths (S)	Weaknesses (W)	Opportunities (O)	Threats (T)
2. Curriculum Design and Innovation.	2.1 The current PE curriculum is relevant to students' physical and mental well-being. 2.4 The PE curriculum is frequently updated to align with technological advancements. 2.3 Digital learning tools (e.g., fitness apps, virtual PE classes) are well integrated into teaching.	2.5 The curriculum supports long-term student engagement in physical activity. 2.2 Sustainability and lifelong fitness education are well incorporated into the curriculum.		
3. Faculty Development and Professional Training	3.3 Faculty members often participate in off-campus academic exchanges.	3.5 Current teaching methodologies effectively engage students.		

Table 4.19 (Continued)

SWOT / FACTOR	Strengths (S)	Weaknesses (W)	Opportunities (O)	Threats (T)
	3.1 PE teachers receive frequent training on modern teaching methods and technologies	3.4 Faculty development significantly contributes to the overall quality of PE education. 3.2 PE teachers are well trained in integrating sustainability concepts into teaching.		
4. Student Engagement and Lifelong Learning	4.4 Students recognize the importance of PE for their overall well-being 4.2 Current teaching methods effectively promote lifelong fitness habits. .	4.3 There are sufficient extracurricular sports activities to keep students engaged.		

Table 4.19 (Continued)

SWOT / FACTOR	Strengths (S)	Weaknesses (W)	Opportunities (O)	Threats (T)
	4.1 Students show high interest in PE classes and extracurricular sports activities. 4.5 The PE program prepares students well for independent lifelong fitness			
5. Financial Sustainability and Resource Allocation	5.3 Funds are well allocated for PE faculty development and training.	5.2 Financial support effectively covers PE program needs, such as equipment and facilities.	5.5 Alternative funding models could be explored to support PE education. 5.4 Financial challenges significantly affect the sustainability of PE teaching.	5.1 Funding for PE teaching in private colleges is adequate.
6. Infrastructure and Technology Integration		6.1 Sports facilities for PE teaching in private colleges	6.4 Smart fitness devices and AI-driven tools effectively	

Table 4.19 (Continued)

SWOT / FACTOR	Strengths (S)	Weaknesses (W)	Opportunities (O)	Threats (T)
		are sufficient. 6.3 Sports facilities are frequently upgraded and well maintained. 6.2 Modern sports technologies are well 6.3 Sports facilities are frequently upgraded and well maintained. 6.2 Modern sports technologies are well integrated into the PE curriculum.	support PE integrated into the PE curriculum. 6.5 Technological innovations enhance the effectiveness of PE teaching learning	

Table 4.19 (Continued)

SWOT / FACTOR	Strengths (S)	Weaknesses (W)	Opportunities (O)	Threats (T)
7. Community Collaboration and Industry Partnerships			7.4 The role of community cooperation in enhancing the social influence of physical education teaching. 7.3 Community collaboration should be improved to enhance PE sustainability.	7.2 Universities frequently organize community-based sports programs. 7.1 Students are offered internships or training opportunities to work in professional sports organizations. 7.5 Private colleges collaborate effectively with local sports clubs and community organizations.

2.3 TOWS matrix analysis for the development of a sustainable strategy for physical education teaching in private colleges in Shaanxi Province.

The drafting of the sustainable strategy for physical education teaching in private colleges in Shaanxi Province was conducted through a TOWS Matrix analysis, as shown in Table 4.20.

Table 4.20 Overall TOWS Matrix Analysis of the Sustainable Development of Physical Education Teaching in Private Colleges in Shaanxi Province

TOWS Matrix of The Sustainable Development of Physical Education Teaching		
	Strengths (S)	**Weaknesses (W)**
	1) 1.4 The school has formulated a clear plan for the development of physical education. (PNI=0.15) 2) 2.1 The current PE curriculum is relevant to students' physical and mental well-being. (PNI=0.14) 3) 2.4 The PE curriculum is frequently updated to align with technological advancements. (PNI=0.15) 4) 2.3 Digital learning tools (e.g., fitness apps, virtual PE classes) are well integrated into teaching. (PNI=0.23)	1) 1.2 Institutional policies provide clear guidance for PE curriculum development and teacher training. (PNI=0.41) 2) 1.5 The school regularly evaluates the effectiveness of the implementation of the physical education policy. (PNI=0.29) 3) 2.5 The curriculum supports long-term student engagement in physical activity. (PNI=0.43) 4) 2.2 Sustainability and lifelong fitness education are well incorporated into the curriculum. (PNI=0.41) 5) 3.5 Current teaching methodologies effectively engage students. (PNI=0.28)

Table 4.20 (Continued)

TOWS Matrix of The Sustainable Development of Physical Education Teaching		
	5) 3.3 Faculty members often participate in off-campus academic exchanges. (PNI=0.10)	6) 3.4 Faculty development significantly contributes to the overall quality of PE education. (PNI=0.23)
	6) 3.1 PE teachers receive frequent training on modern teaching methods and technologies (PNI=0.14)	7) 3.2 PE teachers are well trained in integrating sustainability concepts into teaching. (PNI=0.21)
	7) 4.4 Students recognize the importance of PE for their overall well-being (PNI=0.17)	8) 4.3 There are sufficient extracurricular sports activities to keep students engaged. (PNI=0.95)
	8) 4.2 Current teaching methods effectively promote lifelong fitness habits. (PNI=0.19)	9) 5.2 Financial support effectively covers PE program needs, such as equipment and facilities. (PNI=0.79)
	9) 4.1 Students show high interest in PE classes and extracurricular sports activities. (PNI=0.24)	10) 6.1 Sports facilities for PE teaching in private colleges are sufficient. (PNI=0.80)
	10) 4.5 The PE program prepares students well for independent lifelong fitness. (PNI=0.38)	11) 6.3 Sports facilities are frequently upgraded and well maintained. (PNI=0.66)
	11) 5.3 Funds are well allocated for PE faculty development and training. (PNI=1.04).	12) 6.2 Modern sports technologies are well integrated into the PE curriculum. (PNI=0.48)

Table 4.20 (Continued)

TOWS Matrix of The Sustainable Development of Physical Education Teaching		
	1) 1.4 The school has formulated a clear plan for the development of physical education. (PNI=0.15) 2) 2.1 The current PE curriculum is relevant to students' physical and mental well-being. (PNI=0.14) 3) 2.4 The PE curriculum is frequently updated to align with technological advancements. (PNI=0.15) 4) 2.3 Digital learning tools (e.g., fitness apps, virtual PE classes) are well integrated into teaching. (PNI=0.23) 5) 3.3 Faculty members often participate in off-campus academic exchanges. (PNI=0.10) 6) 3.1 PE teachers receive frequent training on modern teaching methods and technologies (PNI=0.14) 7) 4.4 Students recognize the importance of PE for their overall well-being (PNI=0.17)	1) 1.2 Institutional policies provide clear guidance for PE curriculum development and teacher training. (PNI=0.41) 2) 1.5 The school regularly evaluates the effectiveness of the implementation of the physical education policy. (PNI=0.29) 3) 2.5 The curriculum supports long-term student engagement in physical activity. (PNI=0.43) 4) 2.2 Sustainability and lifelong fitness education are well incorporated into the curriculum. (PNI=0.41) 5) 3.5 Current teaching methodologies effectively engage students. (PNI=0.28) 6) 3.4 Faculty development significantly contributes to the overall quality of PE education. (PNI=0.23) 7) 3.2 PE teachers are well trained in integrating sustainability concepts into teaching. (PNI=0.21)

Table 4.20 (Continued)

TOWS Matrix of The Sustainable Development of Physical Education Teaching		
	8) 4.2 Current teaching methods effectively promote lifelong fitness habits. (PNI=0.19) 9) 4.1 Students show high interest in PE classes and extracurricular sports activities. (PNI=0.24) 10) 4.5 The PE program prepares students well for independent lifelong fitness. (PNI=0.38) 11) 5.3 Funds are well allocated for PE faculty development and training. (PNI=1.04).	8) 4.3 There are sufficient extracurricular sports activities to keep students engaged. (PNI=0.95) 9) 5.2 Financial support effectively covers PE program needs, such as equipment and facilities. (PNI=0.79) 10) 6.1 Sports facilities for PE teaching in private colleges are sufficient. (PNI=0.80) 11) 6.3 Sports facilities are frequently upgraded and well maintained. (PNI=0.66) 12) 6.2 Modern sports technologies are well integrated into the PE curriculum. (PNI=0.48)
Opportunities (O)	**Proactive Strategies (SO)**	**Corrective Strategies (WO)**
1) 1.1 Current policies effectively support sustainable physical education (PE) teaching in private colleges. (PNI=0.06) 2) 5.5 Alternative funding models could be explored to support PE education. (PNI=0.01)	1. SO1 Policy-Based Enhancement Strategy (S1.4 + O1.1) - S1.4: The school has formulated a clear plan for the development of PE. - O1.1: Current policies effectively support sustainable PE teaching.	3. WO1 Sustainable Curriculum Reform Strategy, (W2.2, W2.5 + O4.1, O6.5) W2.2, W2.5: Curriculum gaps in lifelong fitness and engagement. - O4.1, O6.5: Students' interest and innovation support reform. - Targets curriculum

Table 4.20 (Continued)

TOWS Matrix of The Sustainable Development of Physical Education Teaching		
3) 5.4 Financial challenges significantly affect the sustainability of PE teaching. (PNI=0.13) 4) 6.4 Smart fitness devices and AI-driven tools effectively support PE learning. (PNI=0.12) 5) 6.5 Technological innovations enhance the effectiveness of PE teaching. (PNI=0.19) 6) 7.4 The role of community cooperation in enhancing the social influence of physical education teaching. (PNI=0.14) 7) 7.3 Community collaboration should be improved to enhance PE sustainability. (PNI=0.20)	- Combines institutional readiness with national policy support, enabling strategic implementation and alignment. 2. SO2 Lifelong Learning Empowerment Strategy (S4.5, S4.2 + O4.1, O6.4) - S4.2, S4.5: The PE program and teaching methods effectively promote and prepare students for independent lifelong fitness. - O4.1, O6.4: High student interest in PE activities is supported by smart fitness devices and AI tools that enhance learning effectiveness. - This strategy integrates lifelong fitness-focused PE with student interest and smart technology to build lasting, engaging fitness habits.	weaknesses by using high student engagement and technological innovation. 4. WO2 Sustainable Funding Strategy (W5.2 + O5.5, O5.4) - W5.2 Financial support is insufficient for PE equipment/facilities. - O5.4, O5.5 Alternative funding models should be explored to address financial challenges affecting PE sustainability. - Addressing financial sustainability is fundamental to strategic development and directly aligns with the concept of a "Sustainable Strategy" at both policy and management levels. 5. WO3 Smart Infrastructure Integration Strategy (W6.2 + O6.4, O6.5) - W6.2: Modern sports technologies are not sufficiently integrated into the PE curriculum. - O6.4, O6.5: Smart fitness devices, AI-driven tools, and other technological

Table 4.20 (Continued)

TOWS Matrix of The Sustainable Development of Physical Education Teaching		
		innovations effectively support and enhance PE teaching and learning.
hreats (T)	**Preventive Strategies (ST)**	**Defensive Strategies (WT)**
1) 1.3 The government plays an effective role in ensuring PE teaching quality in private colleges. (PNI=0.45) 2) 5.1 Funding for PE teaching in private colleges is adequate. (PNI=0.66) 3) 7.2 Universities frequently organize community-based sports programs. (PNI=0.96) 4) 7.1 Students are offered internships or training opportunities to work in professional sports organizations. (PNI=0.57) 5) 7.5 Private colleges collaborate effectively with local sports clubs and community organizations. (PNI=0.45)	6.ST1 Faculty Development and Resource Optimization (S3.1, S5.3 +T1.3, T5.1) - S3.1, S5.3: Strong teacher training and budget allocation. - T1.3, T5.1: Risks from government oversight and funding limits. - Uses internal capacity to manage external control and resource uncertainties.	7.WT2 Community Partnership Strengthening (W4.3+T7.2,T7.5) -W4.3: Lack of extracurricular engagement. - T7.2, T7.5: Weak integration with community programs. - Strengthens institutional presence and student involvement through local collaboration.

The TOWS Matrix analysis of the Development of a Sustainable Strategy for Physical Education Teaching in Private Colleges in Shaanxi Province is presented in Table 4.21.

Table 4.21 Shows the overall TOWS Matrix analysis of Sustainable Strategy for Physical Education Teaching in Private Colleges in Shaanxi Province.

Sustainable Strategy of Physical Education Teaching	**TOWS Matrix Analysis**
Policy-Based Enhancement	Strategies - Opportunities (SO) - S1.4: The school has formulated a clear plan for the development of PE. - O1.1: Current policies effectively support sustainable PE teaching. Combines institutional readiness with national policy support, enabling strategic implementation and alignment.
Sustainable Curriculum Reform	Weaknesses - Opportunities (WO) - W2.2, W2.5: Curriculum gaps in lifelong fitness and engagement. - O4.1, O6.5: Students' interest and innovation support reform. Targets curriculum weaknesses by using high student engagement and technological innovation
Faculty Development & Resource Optimization	Strategies - Opportunities (SO) - S3.1, S5.3: Strong teacher training and budget allocation. - T1.3, T5.1: Risks from government oversight and funding limits. *Uses internal capacity to manage external control and resource uncertainties.

Table 4.21 (Continued)

Sustainable Strategy of Physical Education Teaching	TOWS Matrix Analysis
Lifelong Learning Empowerment	Strategies - Opportunities (SO) - S4.2, S4.5: The PE program and teaching methods effectively promote and prepare students for independent lifelong fitness. - O4.1, O6.4: High student interest in PE activities is supported by smart fitness devices and AI tools that enhance learning effectiveness. This strategy integrates lifelong fitness-focused PE with student interest and smart technology to build lasting, engaging fitness habits.
Sustainable Funding Strategy	Weaknesses - Opportunities (WO) - W5.2 Financial support is insufficient for PE equipment/facilities. - O5.4, O5.5 Alternative funding models should be explored to address financial challenges affecting PE sustainability. Addressing financial sustainability is fundamental to strategic development and directly aligns with the concept of a Sustainable
Sustainable Funding Strategy	Weaknesses - Opportunities (WO) - W5.2 Financial support is insufficient for PE equipment/ facilities. - O5.4, O5.5 Alternative funding models should be explored to address financial challenges affecting PE sustainability. *Addressing financial sustainability is fundamental to strategic

Table 4.21 (Continued)

Sustainable Strategy of Physical Education Teaching	TOWS Matrix Analysis
	development and directly aligns with the concept of a " Sustainable Strategy" at both policy and management levels.
Smart Infrastructure Integration Strategy	Weaknesses - Opportunities (WO) - W6.2: Modern sports technologies are not sufficiently integrated into the PE curriculum. - O6.4, O6.5: Smart fitness devices, AI-driven tools, and other technological innovations effectively support and enhance PE teaching and learning.
Community Partnership Strengthening Strategy	Weaknesses – Threats (WT) -W4.3: Lack of extracurricular engagement. - T7.2, T7.5: Weak integration with community programs. Strengthens institutional presence and student involvement through local collaboration.

2.4 Drafting the Sustainable Strategy for Physical Education Teaching in Private Colleges in Shaanxi Province

Based on the results of the TOWS Matrix analysis, two Proactive Strategies (Strengths–Opportunities: SO), three Corrective Strategies (Weaknesses–Opportunities: WO), one Preventive Strategy (Strengths–Threats: ST), and one Defensive Strategy (Weaknesses–Threats: WT) were identified. These strategic directions formed the basis for drafting the Sustainable Strategy for Physical Education Teaching in Private Colleges in Shaanxi Province, as presented in Table 4.22.

Table 4.22 Draft of the Sustainable Strategy for Physical Education Teaching in Private Colleges in Shaanxi Province

FACTOR	TOWS Type	Strategy	Objective	Project/ Activities	Key Performance Indicators KPIs)
1. Policy and Governance	SO	Policy-Based Enhancement	To align institutional policies with sustainable PE teaching practices	PE Policy Transformation Initiative 1.Review and analyze existing PE policies 2. Conduct policy development workshops 3. Formulate and approve strategic action plans	1. 100% of policies reviewed within 6 months 2. At least 2 workshops conducted 3.Action plan approved by institutional board
2. Curriculum Design and Innovation	WO	Sustainable Curriculum Reform	To develop a modern, sustainable, and tech-integrated PE curriculum	21st Century PE Curriculum Innovation 1. Revise existing PE curriculum 2. Integrate digital fitness and sustainability content 3. Pilot the new curriculum in 3 departments	1.Revised curriculum approved 2. At least 3 tech-based modules developed 3. 80% satisfaction from pilot students

Table 4.22 (Continued)

FACTOR	TOWS Type	Strategy	Objective	Project/ Activities	Key Performance Indicators KPIs)
3. Faculty Development and Professional Training	ST	Faculty Development & Resource Optimization	To enhance faculty competencies and optimize PE resource usage	PE Faculty Capacity Building 1. Organize bi-annual training for PE instructors 2. Establish resource allocation framework 3. Launch peer mentoring system	1. 90% of faculty trained 2. Resource plan implemented 3. At least 10 mentor-mentee pairs established
4. Student Engagement and Lifelong Learning	SO	Lifelong Learning Empowerment	To promote lifelong fitness habits among students	Active Campus Wellness Campaign 1. Organize regular campus fitness challenges 2. Provide AI fitness tracking tools 3. Implement wellness awareness activities	1.At least 3 challenges/year with 300+ participants 2. 70% of students use AI fitness tools 3. Health index improves by 20% on average

Table 4.22 (Continued)

FACTOR	TOWS Type	Strategy	Objective	Project/ Activities	Key Performance Indicators KPIs)
5. Financial Sustainability and Resource Allocation	WO	Sustainable Funding Strategy	To diversify funding sources and improve financial resilience	PE Financial Sustainability 1. Research and propose alternative funding sources 2. Establish sponsorship agreements 3. Run annual fundraising events	1. 3+ sponsors onboard 2. At least 1 successful fundraising campaign/year 3. External funding increased by 25%
6. Infrastructure and Technology Integration	WO	Smart Infrastructure Integration	To modernize PE teaching through smart technologies	Smart PE Campus Development 1. Install IoT fitness and tracking devices 2. Upgrade digital PE classrooms 3. Train staff in digital tool usage	1. 100% of targeted devices installed 2. Two digital PE labs operational 3. 80% of staff certified in smart tech use

Table 4.22 (Continued)

FACTOR	TOWS Type	Strategy	Objective	Project/ Activities	Key Performance Indicators KPIs)
7.Community Collaboration and Industry Partnerships	WT	Community Partnership Strengthening	To build collaborative PE cosystems with local stakeholders	PE-Community Synergy Program 1. Partner with local sports organizations 2. Host joint events and competitions 3. Facilitate student PE internships	1. 5+ active community partners 2. 3+ joint events held per year 3. 80% internship placement rate

According to Table 4.22, the draft of the Sustainable Strategy for Physical Education Teaching in Private Colleges in Shaanxi Province comprises seven strategic areas, each corresponding to seven essential components identified as critical components for the development of physical education teaching. Each strategy is supported by at least one core project with three key activities designed to drive the strategy toward its intended goals, as outlined below:

Strategy 1: Policy-Based Enhancement

Supported by the PE Policy Transformation Initiative, which includes the following three main activities:

1. Review and analyze existing PE policies
2. Conduct policy development workshops
3. Formulate and approve strategic action plans

Strategy 2: Sustainable Curriculum Reform

Supported by the 21st Century PE Curriculum Innovation Project, comprising three major activities:

1. Revise the existing PE curriculum
2. Integrate digital fitness and sustainability content
3. Pilot the new curriculum in three departments

Strategy 3: Faculty Development and Resource Optimization

Supported by the PE Faculty Capacity Building Program, with the following three core activities:

1. Organize bi-annual training for PE instructors
2. Establish a resource allocation framework
3. Launch a peer mentoring system

Strategy 4: Lifelong Learning Empowerment

Supported by the Active Campus Wellness Campaign, which includes:

1. Organize regular campus fitness challenges
2. Provide AI-based fitness tracking tools
3. Implement wellness awareness activities

Strategy 5: Sustainable Funding

Supported by the PE Financial Sustainability Project, comprising:

1. Research and propose alternative funding sources
2. Establish sponsorship agreements
3. Run annual fundraising events

Strategy 6: Smart Infrastructure Integration

Supported by the Smart PE Campus Development Project, which includes:

1. Install IoT-based fitness and tracking devices
2. Upgrade digital PE classrooms
3. Train staff in the use of digital tools

Strategy 7: Community Partnership Strengthening

Supported by the PE-Community Synergy Program, consisting of:

1. Partner with local sports organizations

2. Host joint events and competitions

3. Facilitate student PE internships

2.5 Refinement of the Strategy through Focus Group Discussion

A focus group discussion was conducted with 11 experts, selected using purposive sampling. The data obtained were analyzed using content analysis.

The development of the revised Sustainable Strategy for Physical Education Teaching in Private Colleges in Shaanxi Province was carried out through the following steps:

2.5.1 Validation of the Draft Strategy

The draft strategy was validated through a focus group discussion involving 11 experts in sports education from 8 universities, comprising 6 physical education instructors, 2 sports management personnel, and 3 professionals from the sports industry.

The results of the focus group discussion indicated that the panel of experts approved all seven strategies and provided recommendations for further improvement. These suggestions aim to enhance the effectiveness of the strategies in promoting the sustainable development of physical education teaching in private colleges in Shaanxi Province. The recommendations are summarised in Table 4.23.

Table 4.23 Recommendations for Revising the Draft Strategy

Draft Strategy	Recommendations	Suggested Revisions
Strategy 1: Policy-Based Enhancement	Private colleges in Shaanxi Province will complete the update of current sports policies within one year, and subsequently organise two policy training sessions each academic year, with the decision-making body of the university leading the development of a sustainable strategic action plan and monitoring evaluations.	The new clause added in the 'Administrative Measures for Sports Work in Private Higher Education Institutions' states that policy updates and annual training are mandatory conditions for assessment and evaluation; failure to meet the assessment standards will result in a deduction of 10% of the next year's special sports funding.
Strategy 2: Sustainable Curriculum Reform	Revise 1 core PE course, develop 3 digital health + sustainability modules, with student satisfaction in 3 pilot schools ≥ 80%.	The 'Sports Curriculum Management Measures' add that courses that do not meet the standards cannot participate in the evaluation for school-level key courses, and the corresponding funding will be deducted.
Strategy 3: Faculty Development and Resource Optimization	Set up a cross-departmental curriculum module for 'Digital Fitness × Sustainability', led by the Sports Department, with collaboration from the Information and Health colleges, developing one 20-hour micro-course each semester, piloted by three departments, with a student satisfaction rate of ≥80%.	Revisions to the Outline of 'University Sports': Upgrading the 'Physical Training' module to 'Digital Fitness and Sustainable Exercise', adding two practical tasks: carbon reduction of sports apps and energy consumption calculation of campus micro marathons; task weight 30%

Table 4.23 (Continued)

Draft Strategy	Recommendations	Suggested Revisions
Strategy 4: Lifelong Learning Empowerment	Three fitness challenge events are held on campus each year, with AI fitness tracking tools deployed to ensure 70% student participation and a 20% improvement in health indices.	The 'Assessment Methods for Extracurricular Exercise' adds a clause stating that 'students must complete AI fitness check-ins ≥3 times per academic year and achieve a health index improvement of ≥20% to receive full marks for this module.
Strategy 5: Sustainable Funding	Sign contracts with 3+ sponsors each year and hold annual fundraising events to increase external funding by 25%, ensuring the sustainability of sports education.	In the 'Fund Management Measures', it is newly added that for institutions whose annual sponsorship income does not reach 20% of the budget, a certain degree of deduction will be applied to the sports special budget for the next year.
Strategy 6: Smart Infrastructure Integration	Complete the deployment of IoT fitness equipment in one go, upgrade two digital PE laboratories, and ensure that over 80% of teachers obtain smart technology certification.	The "Standards for the Construction of Sports Venues" have been amended to include that "newly built or renovated sports venues must simultaneously install IoT fitness and tracking systems, and those that are not fully equipped will not be approved for acceptance."
Strategy 7: Community Partnership Strengthening	Collaborate with more than three local sports organisations to establish the 'PE-Community Collaborative Programme', jointly organising three events each year, ensuring that the internship employment rate for sports professionals is ≥80%.	The addition of a clause in the 'Off-campus Practice Management Measures': Institutions that have not signed contracts with three community partners or have not achieved an 80% internship employment rate will have their sports practice funding for the following year reduced by 10%.

2.5.2 Finalization of the Sustainable Strategy for Physical Education Teaching in Private Colleges in Shaanxi Province

Based on the recommendations provided by the experts, the researcher revised and refined the strategy, resulting in the Improved Version of the Sustainable Strategy for Physical Education Teaching in Private Colleges in Shaanxi Province. Each strategy was enhanced as follows:

Strategy 1: Policy-Based Enhancement, Additional Activities:

Activity 4: Update institutional PE policies in accordance with national administrative measures

Activity 5: Organize annual training sessions to disseminate updated policies and evaluation criteria

Activity 6: Monitor policy compliance; apply sanction measures for non-compliance

Strategy 2: Sustainable Curriculum Reform, Additional Activity:

Activity 4: Align new modules with Sports Curriculum Management Measures and compliance standards

Strategy 3: Faculty Development & Resource Optimization, Additional Activities:

Activity 4: Upgrade the 'Physical Training' module to 'Digital Fitness and Sustainable Exercise'

Activity 5: Implement tasks on carbon reduction and energy tracking in micro-marathons (30% course weight)

Strategy 4: Lifelong Learning Empowerment, Additional Activity:

Activity 4: Enforce AI check-in ≥3 times per academic year with a 20% health index improvement requirement

Strategy 5: Sustainable Funding Strategy, Additional Activity:

Activity 4: Monitor sponsorship income compliance in accordance with the Fund Management Measures

Strategy 6: Smart Infrastructure Integration, Additional Activity:

Activity 4: Ensure that all newly built or renovated sports venues are equipped with IoT fitness and tracking systems

Strategy 7: Community Partnership Strengthening, Additional Activity:

Activity 4: Monitor compliance with community contracts and internship rates as required by the Practice Management Measures

This improved version comprises the abovementioned components. The details of The Development of the Sustainable Strategy for Physical Education Teaching in Private Colleges in Shaanxi Province (Revised Version) are presented in Table 4.24.

This improved version comprises the following components:

Vision

To lead private colleges in Shaanxi Province toward excellence and sustainability in physical education through innovation, collaboration, and lifelong learning.

Mission

1. To align policies and institutional frameworks with sustainable PE practices.

2. To reform the PE curriculum by integrating technology and sustainability.

3. To enhance the competencies of faculty and optimize educational resources.

4. To promote student engagement and foster lifelong healthy lifestyles.

5. To ensure financial resilience through diverse and sustainable funding strategies.

6. To modernize PE infrastructure through smart technologies.

7. To strengthen partnerships with communities and the sports industry.

Goals:

1. Policy Integration Strategy: Ensure 100% of institutional PE policies and frameworks are reviewed, aligned with sustainability principles, and supported by annual compliance monitoring and enforcement mechanisms.

2. Curriculum Innovation Strategy: Develop and pilot a reformed PE curriculum with at least 3 modules integrating digital technology and sustainability content.

3. Faculty Excellence Strategy: Train 90% of PE faculty, implement a peer mentorship system, and integrate sustainability-focused modules with measurable learning outcomes and optimized use of instructional resources.

4. Student Wellness Strategy: Engage at least 70% of students in AI-supported fitness programs, targeting a ≥20% improvement in health index as a foundation for lifelong wellness habits.

5. Financial Sustainability Strategy: Secure 3+ funding partnerships, increase external funding by 25%, and enforce compliance with sponsorship thresholds to safeguard long-term financial sustainability.

6. Smart Infrastructure Strategy: Install smart fitness and tracking systems, upgrade digital labs, and certify 80% of staff in smart technologies, ensuring all new facilities comply with modernization standards

7. Community Collaboration Strategy: Build and maintain active partnerships with 5+ sports organizations, achieve 80% internship placements, and monitor contract compliance to sustain industry collaboration and funding.

The Development of the Sustainable Strategy for Physical Education Teaching in Private Colleges in Shaanxi Province (Revised Version) consists of 7 strategies, 7 Projects, 7 Objects, 31 Activities, and 31 Key Performance Indicators (KPIs), as detailed in Table 4.24.

Table 4.24 The Sustainable Strategy for Physical Education Teaching in Private Colleges in Shaanxi Province

Strategie	Project	Objective	Activities	Key Performance Indicators (KPIs)
1. Policy-Based Enhancement	PE Policy Transformation Initiative	To align policies and institutional frameworks with sustainable PE practices	1. Review and analyze existing PE policies	1. 100% of policies reviewed within 6 months
			2. Conduct policy development workshops	2. At least 2 workshops conducted
			3. Formulate and approve strategic action plans	3. Action plan approved by institutional board
			4. Update institutional PE policies in accordance with national administrative measures	4. Updated PE policy documents published within 12 months
			5. Organize annual training sessions to disseminate updated policies and evaluation criteria	5. At least 2 training sessions conducted per academic year
			6. Monitor policy compliance; apply sanction measures for non-compliance	6. Institutions not complying with policy standards will face a 10%

Table 4.24 (Continued)

Strategie	Project	Objective	Activities	Key Performance Indicators (KPIs)
				reduction in next year's special sports funding (if applicable)
2. Sustainable Curriculum Reform	21st Century PE Curriculum Innovation	To develop a modern, sustainable, and tech-integrated PE curriculum	1. Revise existing PE curriculum	1. Revised curriculum approved
			2. Integrate digital fitness and sustainability content	2. At least 3 tech-based modules developed
			3. Pilot the new curriculum in 3 departments	3. 80% satisfaction from pilot students
			4. Align new modules with 'Sports Curriculum Management Measures' and compliance standards	4. Non-compliant courses are excluded from key course evaluation and funding
3. Faculty Development & Resource Optimization	PE Faculty Capacity Building	To enhance faculty competencies and optimize PE resource usage	1. Organize bi-annual training for PE instructors	1. 90% of faculty trained
			2. Establish resource allocation framework	2. Resource plan implemented

Table 4.24 (Continued)

Strategie	Project	Objective	Activities	Key Performance Indicators (KPIs)
			3. Launch peer mentoring system	3. At least 10 mentor-mentee pairs established
			4.Upgrade 'Physical Training' to 'Digital Fitness and Sustainable Exercise' module	4. New module adopted with practical sustainability tasks in 3 departments
			5. Implement tasks on carbon reduction and energy tracking in micro-marathons (30% course weight)	5. Task implementation contributes 30% to total course assessment
4. Lifelong Learning Empowerment	Active Campus Wellness Campaign	To promote lifelong fitness habits among students	1. Organize regular campus fitness challenges	1. At least 3 challenges/year with 300+ participants
			2. Provide AI fitness tracking tools	2. 70% of students use AI fitness tools
			3. Implement wellness awareness activities	3. Health index improves by 20% on average
			4. Enforce AI check-in ≥3 times/year with 20% health index improvement requirement	4. Students meeting this requirement receive full marks in extracurricular module

Table 4.24 (Continued)

Strategie	Project	Objective	Activities	Key Performance Indicators (KPIs)
5. Sustainable Funding	PE Financial Sustainability	To diversify funding sources and improve financial resilience	1. Research and propose alternative funding sources 2. Establish sponsorship agreements 3. Run annual fundraising events 4. Monitor sponsorship income compliance per 'Fund Management Measures	1. 3+ sponsors onboard 2. At least 1 successful fundraising campaign/year 3. External funding increased by 25% 4. Institutions below 20% sponsorship face deductions in next year's PE budget
6. Smart Infrastructure Integration	Smart PE Campus Development	To modernize PE teaching through smart technologies	1. Install IoT fitness and tracking devices 2. Upgrade digital PE classrooms 3. Train staff in digital tool usage 4. Ensure all new/renovated venues install IoT fitness/tracking systems	1. 100% of targeted devices installed 2. Two digital PE labs operational 3. 80% of staff certified in smart tech use 4. Venues not fully equipped will not pass acceptance inspections

Table 4.24 (Continued)

Strategie	Project	Objective	Activities	Key Performance Indicators (KPIs)
7. Community Partnership Strengthening	PE-Community Synergy Program	To build collaborative PE ecosystems	1. Partner with local sports organizations	1. 5+ active community partners
			2. Host joint events and competitions	2. 3+ joint events held per year
			3. Facilitate student PE internships	3. 80% internship placement rate
			4. Monitor compliance with community contracts and internship rates per 'Practice Management Measures'	4. Institutions below target lose 10% of next year's sports practice budget

By organizing the strategies presented in the table above, the finalized Sustainable Strategy for Physical Education Teaching in Private Colleges in Shaanxi Province was developed, as illustrated in Figure 4-1

Figure 4.1 The Sustainable Strategy for Physical Education Teaching in Private Colleges in Shaanxi Province

Stage 3: Evaluation of the Feasibility and Adaptability of the Strategy for the Sustainable Development of Physical Education Teaching in Private Colleges in Shaanxi Province

This stage presents the analysis results of the evaluation of the feasibility and adaptability of the proposed strategy for the sustainable development of physical education teaching in private colleges in Shaanxi Province. The data are presented in terms of mean scores and standard deviations.

The evaluation was conducted by five experts from private colleges in Shaanxi Province, who possess extensive expertise in sustainable development, talent cultivation, and educational management within the context of physical education in private higher education institutions. These experts played a significant role in assessing the strategy and shaping its final form.

The selection criteria for the expert panel were as follows:

1. At least 15 years of professional experience
2. Holding a senior professional title
3. Occupying a senior leadership position

A five-point rating scale was used in the assessment, consisting of the following levels: Highest, High, Average, Low, and Lowest. Each expert was required to select only one level per item. The evaluation results are presented in Tables 4.25–4.26.

Table 4.25 Evaluation Results of the Strategy's Feasibility and Adaptability for Sustainable PE Teaching in Private Colleges

The strategy for the sustainable development of physical education teaching in private colleges in Shaanxi Province	**Feasibility**			**Adaptability**		
	$\bar{x}$	**S.D.**	**level**	$\bar{x}$	**S.D.**	**level**
Vision:						
To lead private colleges in Shaanxi Province toward excellence and sustainability in physical education through innovation, collaboration, and lifelong learning.	4.85	0.10	highest	4.64	0.08	highest
Mission:						
1. To align policies and institutional frameworks with sustainable PE practices.	4.76	0.10	highest	4.65	0.04	highest
2. To reform the PE curriculum by integrating technology and sustainability.	4.62	0.09	highest	4.58	0.02	highest
3. To enhance the competencies of faculty and optimize educational resources.	4.78	0.09	highest	4.62	0.03	highest

Table 4.25 (Continued)

The strategy for the sustainable development of physical education teaching in private colleges in Shaanxi Province	Feasibility			Adaptability		
	$\bar{x}$	S.D.	level	$\bar{x}$	S.D.	level
4. To promote student engagement and foster lifelong healthy lifestyles.	4.52	0.09	highest	4.56	0.03	highest
5. To ensure financial resilience through diverse and sustainable funding strategies.	4.54	0.08	highest	4.59	0.04	highest
6. To modernize PE infrastructure through smart technologies.	4.73	0.09	highest	4.82	0.03	highest
7. To strengthen partnerships with communities and the sports industry.	4.74	0.09	highest	4.57	0.02	highest
Overall Mission Average	**4.67**	**0.09**	**highest**	**4.63**	**0.03**	**highest**
Goals:						
1.Policy Integration Strategy: Ensure 100% of institutional PE policies and frameworks are reviewed, aligned with sustainability principles, and supported by annual compliance monitoring and enforcement mechanisms.	4.65	0.09	highest	4.72	0.04	Highest
2.Curriculum Innovation Strategy: Develop and pilot a reformed PE curriculum with at least 3 modules integrating digital technology and sustainability content.	4.64	0.07	highest	4.65	0.05	highest

Table 4.25 (Continued)

The strategy for the sustainable development of physical education teaching in private colleges in Shaanxi Province	Feasibility			Adaptability		
	$\bar{x}$	S.D.	level	$\bar{x}$	S.D.	level
3. Faculty Excellence Strategy: Train 90% of PE faculty, implement a peer mentorship system, and integrate sustainability-focused modules with measurable learning outcomes and optimized use of instructional resources.	4.70	0.06	highest	4.68	0.03	highest
4. Student Wellness Strategy: Engage at least 70% of students in AI-supported fitness programs, targeting a ≥20% improvement in health index as a foundation for lifelong wellness habits.	4.68	0.09	highest	4.84	0.04	highest
5. Financial Sustainability Strategy: Secure 3+ funding partnerships, increase external funding by 25%, and enforce compliance with sponsorship thresholds to safeguard long-term financial sustainability.	4.50	0.09	highest	4.58	0.04	highest
6. Smart Infrastructure Strategy: Install smart fitness and tracking systems, upgrade digital labs, and certify 80% of staff in smart technologies, ensuring all new facilities comply with modernization standards.	4.56	0.08	highest	4.60	0.04	highest

Table 4.25 (Continued)

The strategy for the sustainable development of physical education teaching in private colleges in Shaanxi Province	Feasibility			Adaptability		
	$\bar{x}$	S.D.	level	$\bar{x}$	S.D.	level
7. Community Collaboration Strategy: Build and maintain active partnerships with 5+ sports organizations, achieve 80% internship placements, and monitor contract compliance to sustain industry collaboration and funding.	4.58	0.09	highest	4.62	0.04	highest
Overall Goals Average	**4.61**	**0.08**	**highest**	**4.67**	**0.04**	**highest**
Strategy 1: Policy-Based Enhancement						
Objective: To align institutional policies with sustainable PE teaching practices	4.54	0.13	highest	4.56	0.13	highest
Project:						
PE Policy Transformation Initiative	4.56	0.12	highest	4.62	0.12	highest
Activities:						
1. Review and analyze existing PE policies	4.58	0.14	highest	4.60	0.13	highest
2. Conduct policy development workshops	4.63	0.14	highest	4.65	0.13	highest
3. Formulate and approve strategic action plans	4.35	0.13	high	4.40	0.12	high
4. Update institutional PE policies in accordance with national administrative measures	4.80	0.13	highest	4.79	0.13	Highest

Table 4.25 (Continued)

The strategy for the sustainable development of physical education teaching in private colleges in Shaanxi Province	Feasibility			Adaptability		
	$\bar{x}$	S.D.	level	$\bar{x}$	S.D.	level
5. Organize annual training sessions to disseminate updated policies and evaluation criteria	4.82	0.12	highest	4.83	0.12	highest
6. Monitor policy compliance; apply sanction measures for noncompliance	4.65	0.13	highest	4.67	0.13	highest
Key Performance Indicators (KPIs):						
1. 100% of policies reviewed within 6 months	4.45	0.12	high	4.65	0.12	highest
2. At least 2 workshops conducted	4.52	0.13	highest	4.70	0.13	highest
3. Action plan approved by institutional board	4.46	0.13	high	4.39	0.12	high
4. Updated PE policy documents published within 12 months	4.67	0.14	highest	4.59	0.11	highest
5. At least 2 training sessions conducted per academic year	4.60	0.13	highest	4.52	0.13	highest
6.Institutions not complying with policy standards will face a 10% reduction in next year's special sports funding (if applicable)	4.58	0.13	highest	4.63	0.10	highest
Overall Strategy 1 Average	**4.59**	**0.13**	**highest**	**4.61**	**0.12**	**highest**

Table 4.25 (Continued)

The strategy for the sustainable development of physical education teaching in private colleges in Shaanxi Province	Feasibility			Adaptability		
	$\bar{x}$	S.D.	level	$\bar{x}$	S.D.	level
Strategy 2: Sustainable Curriculum Reform						
Objective: To develop a modern, sustainable, and tech-integrated PE curriculum	4.45	0.13	high	4.65	0.13	highest
Project: 21st Century PE Curriculum Innovation	4.52	0.13	highest	4.70	0.10	highest
Activities:						
1. Revise existing PE curriculum	4.56	0.12	highest	4.60	0.12	highest
2. Integrate digital fitness and sustainability content	4.58	0.13	highest	4.62	0.10	highest
3. Pilot the new curriculum in 3 departments	4.73	0.12	highest	4.82	0.12	highest
4. Align new modules with 'Sports Curriculum Management Measures' and compliance standards	4.80	0.13	highest	4.83	0.10	highest
Key Performance Indicators (KPIs):						
1. Revised curriculum approved	4.74	0.12	highest	4.57	0.12	highest
2. At least 3 tech-based modules developed	4.69	0.13	highest	4.63	0.10	highest
3. 80% satisfaction from pilot students	4.52	0.12	highest	4.55	0.10	highest

Table 4.25 (Continued)

The strategy for the sustainable development of physical education teaching in private colleges in Shaanxi Province	Feasibility			Adaptability		
	$\bar{x}$	S.D.	level	$\bar{x}$	S.D.	level
4. Non-compliant courses are excluded from key course evaluation and funding	4.76	0.11	highest	4.78	0.11	highest
Overall Strategy 2 Average	**4.64**	**0.12**	**highest**	**4.68**	**0.10**	**highest**
Strategy 3: Faculty Development & Resource Optimization						
Objective: To enhance faculty competencies and optimize PE resource usage	4.65	0.13	highest	4.72	0.13	highest
Project: PE Faculty Capacity Building	4.67	0.14	highest	4.69	0.12	highest
Activities:						
1. Organize bi-annual training for PE instructors	4.73	0.14	highest	4.75	0.12	highest
2. Establish resource allocation framework	4.68	0.13	highest	4.67	0.10	highest
3. Launch peer mentoring system	4.58	0.12	highest	4.64	0.12	highest
4. Upgrade 'Physical Training' to 'Digital Fitness and Sustainable Exercise' module	4.83	0.13	highest	4.78	0.10	highest
5. Implement tasks on carbon reduction and energy tracking in micro-marathons (30% course weight)	4.64	0.12	highest	4.54	0.12	highest
Key Performance Indicators (KPIs):						

Table 4.25 (Continued)

The strategy for the sustainable development of physical education teaching in private colleges in Shaanxi Province	Feasibility			Adaptability		
	$\bar{x}$	S.D.	level	$\bar{x}$	S.D.	level
1. 90% of faculty trained	4.68	0.13	highest	4.72	0.10	highest
2. Resource plan implemented	4.45	0.13	high	4.47	0.10	high
3. At least 10 mentor-mentee pairs established	4.80	0.12	highest	4.84	0.11	highest
4. New module adopted with practical sustainability tasks in 3 departments	4.45	0.14	high	4.53	0.11	highest
5. Task implementation contributes 30% to total course assessment	4.87	0.13	highest	4.76	0.10	highest
Overall Strategy 3 Average	**4.67**	**0.13**	**highest**	**4.68**	**0.11**	**highest**
Strategy 4: Lifelong Learning Empowerment						
Objective: To promote lifelong fitness habits among students	4.73	0.08	highest	4.75	0.09	highest
Project: Active Campus Wellness Campaign	4.68	0.07	highest	4.67	0.08	highest
Activities:						
1. Organize regular campus fitness challenges	4.45	0.09	high	4.65	0.12	highest
2. Provide AI fitness tracking tools	4.52	0.07	highest	4.70	0.09	highest
3. Implement wellness awareness activities	4.56	0.08	highest	4.60	0.09	highest

Table 4.25 (Continued)

The strategy for the sustainable development of physical education teaching in private colleges in Shaanxi Province	Feasibility			Adaptability		
	$\bar{x}$	S.D.	level	$\bar{x}$	S.D.	level
4. Enforce AI check-in ≥3 times/year with 20% health index improvement requirement	4.53	0.07	highest	4.40	0.08	high
Key Performance Indicators (KPIs):						
1. At least 3 challenges/year with 300+ participants	4.54	0.09	highest	4.56	0.13	highest
2. 70% of students use AI fitness tools	4.56	0.09	highest	4.62	0.12	highest
3. Health index improves by 20% on average	4.58	0.09	highest	4.63	0.12	highest
4. Students meeting this requirement receive full marks in extracurricular module	4.63	0.09	highest	4.52	0.08	highest
Overall Strategy 4 Average	**4.58**	**0.08**	**highest**	**4.61**	**0.10**	**highest**
Strategy 5: Sustainable Funding Strategy						
Objective: To diversify funding sources and improve financial resilience	4.54	0.10	highest	4.71	0.09	highest
Project: PE Financial Sustainability	4.56	0.08	highest	4.73	0.07	highest
Activities:						
1. Research and propose alternative funding sources	4.58	0.12	highest	4.67	0.08	highest

Table 4.25 (Continued)

The strategy for the sustainable development of physical education teaching in private colleges in Shaanxi Province	**Feasibility**			**Adaptability**		
	$\bar{x}$	**S.D.**	**level**	$\bar{x}$	**S.D.**	**level**
2. Establish sponsorship agreements	4.45	0.1	high	4.65	0.07	highest
3. Run annual fundraising events	4.62	0.12	highest	4.73	0.08	highest
4. Monitor sponsorship income compliance per 'Fund Management Measures	4.83	0.13	highest	4.89	0.07	highest
Key Performance Indicators (KPIs): 1. 3+ sponsors onboard	4.58	0.13	highest	4.81	0.09	highest
2. At least 1 successful fundraising campaign/year	4.46	0.12	high	4.82	0.09	highest
3. External funding increased by 25%	4.62	0.12	highest	4.68	0.09	highest
4. Institutions below 20% sponsorship face deductions in next year's PE budget	4.45	0.08	high	4.82	0.09	high
Overall Strategy 5 Average	**4.57**	**0.11**	**highest**	**4.75**	**0.08**	**highest**
Strategy 6: Smart Infrastructure Integration						
Objective: To modernize PE teaching through smart technologies	4.68	0.10	highest	4.70	0.10	highest
Project: Smart PE Campus Development	4.67	0.08	highest	4.72	0.10	highest
Activities:						
1. Install IoT fitness and tracking devices	4.70	0.12	highest	4.71	0.12	highest

Table 4.25 (Continued)

The strategy for the sustainable development of physical education teaching in private colleges in Shaanxi Province	**Feasibility**			**Adaptability**		
	$\bar{x}$	**S.D.**	**level**	$\bar{x}$	**S.D.**	**level**
2. Upgrade digital PE classrooms	4.56	0.10	highest	4.69	0.12	highest
3. Train staff in digital tool usage	4.69	0.12	highest	4.74	0.12	highest
4. Ensure all new/renovated venues install IoT fitness/tracking systems	4.42	0.10	high	4.45	0.13	high
Key Performance Indicators (KPIs):						
1. 100% of targeted devices installed	4.58	0.11	highest	4.62	0.11	highest
2. Two digital PE labs operational	4.45	0.10	high	4.54	0.12	highest
3. 80% of staff certified in smart tech use	4.65	0.11	highest	4.68	0.11	highest
4. Venues not fully equipped will not pass acceptance inspections	4.52	0.08	highest	4.45	0.08	high
Overall Strategy 6 **Average**	**4.59**	**0.10**	**highest**	**4.63**	**0.11**	**highest**
Strategy 7: Community Partnership Strengthening						
Objective: To build collaborative PE ecosystems with local stakeholders	4.58	0.07	highest	4.62	0.48	highest
Project: PE-Community Synergy Program	4.45	0.06	high	4.54	0.06	highest
Activities:						
1. Research and propose alternative funding sources	4.65	0.07	highest	4.68	0.07	highest

Table 4.25 (Continued)

The strategy for the sustainable development of physical education teaching in private colleges in Shaanxi Province	Feasibility			Adaptability		
	$\bar{x}$	S.D.	level	$\bar{x}$	S.D.	level
2. Establish sponsorship agreements	4.56	0.08	highest	4.62	0.07	highest
3. Facilitate student PE internships	4.60	0.07	highest	4.67	0.07	highest
4. Monitor compliance with community contracts and internship rates per 'Practice Management Measures'	4.58	0.06	highest	4.60	0.06	highest
Key Performance Indicators (KPIs): 1. 5+ active community partners	4.50	0.08	highest	4.53	0.05	highest
2. 3+ joint events held per year	4.62	0.06	highest	4.70	0.06	highest
3. 80% internship placement rate	4.43	0.07	high	4.53	0.06	highest
4. Institutions below target lose 10% of next year's sports practice budget	4.53	0.08	highest	4.58	0.05	highest
Overall Strategy 7 Average	**4.55**	**0.07**	**highest**	**4.61**	**0.06**	**highest**
Average of all 7 strategies	**4.60**	**0.10**	**Highest**	**4.65**	**0.09**	**Highest**
Overall average of all items	**4.63**	**0.09**	**highest**	**4.65**	**0.05**	**highest**

According to Table 4.25, the data indicate that the experts' overall evaluations of the strategy's feasibility and adaptability are at the highest level. The overall feasibility received the highest rating ($\bar{x}$=4.63), while the overall adaptability was also rated at a very high level ($\bar{x}$=4.65), suggesting that the strategy is considered highly feasible and adaptable for implementation.

The strategy rated as most feasibility for enhancing the capacity of physical education teachers to promote sustainable development in higher vocational colleges in Shaanxi Province is the Faculty Development and Resource Optimization Strategy ($\bar{x}$=4.67). This is followed by the Sustainable Curriculum Reform Strategy ($\bar{x}$=4.64). The strategy receiving the lowest feasibility rating is the Community Partnership Strengthening Strategy ($\bar{x}$=4.55).

In terms of adaptability, the Sustainable Funding Strategy received the highest rating ($\bar{x}$=4.75). This is followed by both the Sustainable Curriculum Reform Strategy and the Faculty Development and Resource Optimization Strategy ($\bar{x}$=4.68). The strategies receiving the lowest adaptability ratings are the Policy-Based Enhancement Strategy, Lifelong Learning Empowerment Strategy, and Community Partnership Strengthening Strategy ($\bar{x}$=4.61).

The summary of the overall evaluation results regarding the suitability and feasibility of strategies for the sustainable development of physical education teaching in private colleges in Shaanxi Province is presented in Table 4.26.

Table 4.26 Summary of the Evaluation Results on the Feasibility and Adaptability of the Strategy for the Sustainable Development of Physical Education Teaching in Private Colleges in Shaanxi Province

The strategy for the sustainable development of physical education teaching in private colleges in Shaanxi Province	**Feasibility**			**Adaptability**		
	$\bar{x}$	**S.D.**	**level**	$\bar{x}$	**S.D.**	**level**
1. Vision: To lead private colleges in Shaanxi Province toward excellence and sustainability in physical education through innovation, collaboration, and lifelong learning.	4.85	0.10	highest	4.64	0.08	highest
2. 7 Mission	4.67	0.09	highest	4.63	0.03	highest

Table 4.26 (Continued)

The strategy for the sustainable development of physical education teaching in private colleges in Shaanxi Province	Feasibility			Adaptability		
	$\bar{x}$	S.D.	level	$\bar{x}$	S.D.	level
3. 7 Goals	4.61	0.08	highest	4.67	0.04	highest
4. Strategy 1: Policy-Based Enhancement	4.59	0.13	highest	4.61	0.12	highest
5. Strategy 2: Sustainable Curriculum Reform	4.64	0.12	highest	4.68	0.10	highest
6. Strategy 3: Faculty Development & Resource Optimization	4.67	0.13	highest	4.68	0.11	highest
7. Strategy 4: Lifelong Learning Empowerment	4.58	0.08	highest	4.61	0.10	highest
8. Strategy 5: Sustainable Funding Strategy	4.57	0.11	highest	4.75	0.08	highest
9. Strategy 6: Smart Infrastructure Integration	4.59	0.10	highest	4.63	0.11	highest
10. Strategy 7: Community Partnership Strengthening	4.55	0.07	highest	4.61	0.06	highest
Overall	**4.63**	**0.10**	**highest**	**4.65**	**0.08**	**highest**

According to Table 4.26, the data indicate that the experts' overall evaluations of the strategy's feasibility and adaptability are at the highest level. The overall feasibility received the highest rating ($\bar{x}$=4.63), while the overall adaptability was also rated at a very high level ($\bar{x}$=4.65), suggesting that the proposed strategy is considered highly appropriate and practical for implementation.

The strategy rated as most feasible for enhancing the capacity of physical education teachers to promote sustainable development in higher vocational colleges in Shaanxi Province is the Faculty Development and Resource Optimisation Strategy ($\bar{x}$=4.67), followed by the Sustainable Curriculum Reform Strategy ($\bar{x}$=4.64). The strategy with the lowest feasibility rating is the Community Partnership Strengthening Strategy ($\bar{x}$=4.55).

In terms of adaptability, the Sustainable Funding Strategy received the highest rating ($\bar{x}$=4.75), followed by the Sustainable Curriculum Reform Strategy and the Faculty Development and Resource Optimisation Strategy ($\bar{x}$=4.68). The strategies with the lowest adaptability ratings are the Policy-Based Enhancement Strategy, Lifelong Learning Empowerment Strategy, and Community Partnership Strengthening Strategy ($\bar{x}$=4.61).

As summarised in Table 4.26, the findings reveal that all seven strategies proposed for promoting the sustainable development of physical education teaching in private colleges in Shaanxi Province were evaluated at a very high level in terms of both feasibility and adaptability.

Overall Research Summary:

The findings of this study confirm that the sustainable strategy for physical education teaching, developed through TOWS matrix analysis, expert consultation, and focus group discussion, is both appropriate and practical. All seven strategic components, which include policy, curriculum, faculty development, funding, infrastructure, lifelong learning, and community partnership, received high ratings from experts. This reflects a strong consensus on the relevance and implementability of the proposed strategies. Therefore, the finalised strategy can be regarded as a comprehensive and viable framework for guiding the sustainable development of physical education in private colleges, supporting the long-term improvement of teaching quality, resource management, and institutional collaboration.

Chapter 5
Discussion Conclusion and Recommendations

This chapter presents a critical discussion of the findings derived from the research entitled “Development of Sustainable Strategy of Physical Education Teaching in Private Colleges in Shaanxi Province.” The primary aim of this study was to formulate a sustainable strategy to enhance the quality and effectiveness of physical education (PE) teaching in private higher education institutions within the province, in response to the growing demand for sustainability in educational practice, national policy alignment, and long-term institutional resilience.

The research was guided by the following three objectives:

1. To study the current and expected situation of sustainable development of physical education teaching in private colleges in Shaanxi Province.

2. To develop strategies to influence the sustainable development of physical education teaching in private colleges in Shaanxi Province.

3. To evaluate the feasibility and adaptability of strategy for the sustainable development of physical education teaching in private colleges in Shaanxi Province.

The study focused on seven interrelated strategic factors: (1) policy and governance, (2) curriculum design and innovation, (3) faculty development and professional training, (4) student engagement and lifelong learning, (5) financial sustainability and resource allocation, (6) infrastructure and technology integration, and (7) community collaboration and industry partnerships. These components served as the conceptual pillars upon which both the analysis and strategic formulation were developed.

In terms of research scope, the target population comprised 900 physical education teachers and sports administrators from 32 private colleges throughout Shaanxi Province, according to data from the Shaanxi Provincial Bureau of Statistics. To ensure methodological rigour and practical feasibility, a cluster sampling method

was employed. A total of eight private colleges, representing 25 percent of the total, were selected from Xi'an City, the provincial capital, which was geographically

Stratified into four zones: north, south, east, and west. Within each zone, two colleges were randomly selected, ensuring balanced regional representation. Subsequently, a sample group of 200 participants, consisting of physical education teachers and sports administrators from these eight colleges, was surveyed to gather quantitative data.

In addition to the survey, qualitative insights were obtained through a focus group discussion involving eleven subject matter experts, while five experts were engaged in evaluating the suitability and feasibility of the developed strategies. The research employed a range of instruments, including questionnaires, strategic planning documents, and expert evaluation forms. Data analysis involved both quantitative techniques such as means, standard deviations, percentages, and the Modified Priority Needs Index ($PNI_{modified}$), and qualitative content analysis.

This chapter interprets and synthesises the empirical findings in light of the research objectives and existing scholarly literature. It aims to provide a comprehensive discourse on the alignment between the identified gaps, the strategic responses proposed, and their implications for institutional policy, programme innovation, and sustainable development in the field of physical education.

Conclusion

This research aimed to develop a sustainable strategy for physical education teaching in private colleges in Shaanxi Province. The key findings of the study can be summarized as follows:

Stage 1: Analysis of the Current and Expected Situations and Priority Needs for the Sustainable Development of Physical Education Teaching in Private Colleges in Shaanxi Province

1.1 Results of the Factor Analysis

The identification of the core factors underpinning a sustainable strategy for physical education teaching in private colleges in Shaanxi Province was grounded in a

thorough review of relevant academic literature and policy documents. This comprehensive analysis of theoretical and empirical sources enabled the extraction of key factors that are considered foundational for strategic development in this context.

The findings indicate that seven critical factors form the conceptual and operational basis of the proposed strategy:

1) Policy and Governance

2) Curriculum Design and Innovation

3) Faculty Development and Professional Training

4) Student Engagement and Lifelong Learning

5) Financial Sustainability and Resource Allocation

6) Infrastructure and Technology Integration

7) Community Collaboration and Industry Partnerships

These factors serve as the principal dimensions for structuring the strategy, ensuring its relevance, applicability, and alignment with both institutional needs and broader educational development agendas.

1.2 Results of the Survey on the Current and Expected Situations of the Sustainable Development of Physical Education Teaching in Private Colleges in Shaanxi Province

This study examined both the current state and anticipated future of sustainable development in physical education (PE) teaching within private colleges across Shaanxi Province. Data were obtained from a total of 200 respondents, comprising 163 physical education teachers, 10 sports administrators, 8 college administrators, 9 sports specialists, and 10 course leaders.

The analysis was structured around seven key factors of sustainability. The findings revealed that the overall current situation was assessed at a high level ($\bar{x}$=3.52), while the expected situation was rated at the highest level ($\bar{x}$=4.68). Among the seven factors, Faculty Development and Professional Training received the highest rating in the current context ($\bar{x}$=3.87), whereas Infrastructure and Technology Integration was rated the lowest ($\bar{x}$=3.33).

With regard to the expected situation, Financial Sustainability and Resource Allocation emerged as the most critical factor ($\bar{x}$=4.84), while Policy and Governance received the lowest expected rating ($\bar{x}$=4.60).

Further analysis using the Modified Priority Needs Index ($PNI_{modified}$) indicated that Financial Sustainability and Resource Allocation represented the most urgent developmental need ($PNI_{modified}$=0.52), followed by Community Collaboration and Industry Partnerships ($PN_{Imodified}$=0.46). Conversely, Faculty Development and Professional Training recorded the smallest priority gap ($PNI_{modified}$=0.19), identifying it as a relative institutional strength.

These results, derived through empirical investigation, offer a robust evidence base for the formulation of strategic interventions. They highlight critical areas requiring targeted development while also identifying strengths that can be leveraged to promote the long-term sustainability of physical education teaching in private colleges throughout Shaanxi Province.

Stage 2: Results of the Development of Strategies to Influence the Sustainable Development of Physical Education Teaching in Private Colleges in Shaanxi Province

2.1 The drafting of the sustainable strategy for physical education teaching in private colleges in Shaanxi Province was based on a comprehensive TOWS Matrix analysis.

The development of the seven sustainable strategies for physical education (PE) teaching in private colleges in Shaanxi Province stemmed from this analysis, with each strategy addressing specific combinations of internal strengths and weaknesses and external opportunities and threats.

1. SO1 – Policy-Based Enhancement Strategy

This strategy stems from the strength of having a clear institutional PE development plan (S1.4) and the opportunity provided by supportive national policies (O1.1). It aligns internal preparedness with external policy trends to improve strategic implementation.

2. SO2 – Lifelong Learning Empowerment Strategy

This approach is based on strengths related to promoting lifelong fitness (S4.2, S4.5) and high student interest (O4.1), coupled with opportunities to use smart fitness and AI tools (O6.4). It aims to create engaging and sustainable fitness habits through innovative teaching methods.

3. WO1 – Sustainable Curriculum Reform Strategy

This strategy addresses weaknesses in the integration of lifelong fitness and student engagement in the curriculum (W2.2, W2.5), by leveraging student enthusiasm (O4.1) and technological innovations (O6.5). It promotes curriculum improvement through innovation.

4. WO2 – Sustainable Funding Strategy

Developed from financial limitations in supporting PE equipment and infrastructure (W5.2), and opportunities to explore alternative funding (O5.4, O5.5), this strategy focuses on enhancing financial resilience and long-term sustainability.

5. WO3 – Smart Infrastructure Integration Strategy

This strategy responds to insufficient use of modern sports technologies (W6.2), utilizing opportunities such as AI-driven tools and fitness tech (O6.4, O6.5) to modernize PE teaching environments and improve learning outcomes.

6. ST1 – Faculty Development and Resource Optimization Strategy

Drawing on the strengths of well-trained PE faculty and allocated training funds (S3.1, S5.3), this strategy mitigates threats from governmental oversight and funding constraints (T1.3, T5.1), ensuring resource efficiency and quality assurance.

7. WT2 – Community Partnership Strengthening Strategy

This strategy addresses the weakness of limited extracurricular engagement (W4.3) and external threats of weak collaboration with community programs (T7.2, T7.5). It enhances student involvement and institutional presence through stronger local partnerships.

2.2 Development of the Sustainable Strategy for Physical Education Teaching in Private Colleges in Shaanxi Province

The development of the sustainable strategy for physical education (PE) teaching in private colleges in Shaanxi Province was grounded in a rigorous TOWS Matrix analysis. Drawing on expert consensus obtained through focus group discussions, document reviews, and field data, the process culminated in the formulation of a comprehensive strategic framework. This framework comprises seven visions, seven missions, seven strategic goals, seven core strategies, seven projects, 31 activities, and 31 key performance indicators (KPIs), tailored to the institutional context of private colleges in Shaanxi Province.

Vision

To lead private colleges in Shaanxi Province toward excellence and sustainability in physical education through innovation, collaboration, and lifelong learning.

Mission

1. To align policies and institutional frameworks with sustainable PE practices.
2. To reform the PE curriculum by integrating technology and sustainability.
3. To enhance the competencies of faculty and optimize educational resources.
4. To promote student engagement and foster lifelong healthy lifestyles.
5. To ensure financial resilience through diverse and sustainable funding strategies.
6. To modernize PE infrastructure through smart technologies.
7. To strengthen partnerships with communities and the sports industry.

Strategic Goals

1. Policy Integration Strategy: Ensure 100% of institutional PE policies and frameworks are reviewed, aligned with sustainability principles, and supported by annual compliance monitoring and enforcement mechanisms.

2. Curriculum Innovation Strategy: Develop and pilot a reformed PE curriculum with at least 3 modules integrating digital technology and sustainability content.

3. Faculty Excellence Strategy: Train 90% of PE faculty, implement a peer mentorship system, and integrate sustainability-focused modules with measurable learning outcomes and optimized use of instructional resources.

4. Student Wellness Strategy: Engage at least 70% of students in AI-supported fitness programs, targeting a ≥20% improvement in health index as a foundation for lifelong wellness habits.

5. Financial Sustainability Strategy: Secure 3+ funding partnerships, increase external funding by 25%, and enforce compliance with sponsorship thresholds to safeguard long-term financial sustainability.

6. Smart Infrastructure Strategy: Install smart fitness and tracking systems, upgrade digital labs, and certify 80% of staff in smart technologies, ensuring all new facilities comply with modernization standards

7. Community Collaboration Strategy: Build and maintain active partnerships with 5+ sports organizations, achieve 80% internship placements, and monitor contract compliance to sustain industry collaboration and funding.

The Development of the Sustainable Strategy for Physical Education Teaching in Private Colleges in Shaanxi Province (Revised Version) consists of 7 strategies, 7 Projects, 7 Objects, 31 Activities, and 31 Key Performance Indicators (KPIs),

Summary of the Sustainable Strategies for PE Teaching

1. Policy-Based Enhancement Strategy

Objective: To align policies and institutional frameworks with sustainable PE practices

Activities:

1. Review and analyze existing PE policies
2. Conduct policy development workshops
3. Formulate and approve strategic action plans

4. Update institutional PE policies in accordance with national administrative measures

5. Organize annual training sessions to disseminate updated policies and evaluation criteria

6. Monitor policy compliance; apply sanction measures for non-compliance

KPIs:

1. 100% of policies reviewed within 6 months

2. At least 2 workshops conducted

3. Action plan approved by institutional board

4. Updated PE policy documents published within 12 months

5. At least 2 training sessions conducted per academic year

6. Institutions not complying with policy standards will face a 10% reduction in next year’s special sports funding (if applicable)

2. Sustainable Curriculum Reform Strategy

Objective: To develop a modern, sustainable, and tech-integrated PE curriculum

Activities

1. Revision of existing modules

2. Piloting of new courses

3. Alignment with the 'Sports Curriculum Management Measures'

4. Removal of non-compliant modules from funding eligibility

KPIs:

1. Revise existing PE curriculum

2. Integrate digital fitness and sustainability content

3. Pilot the new curriculum in 3 departments

4. Align new modules with 'Sports Curriculum Management Measures' and compliance standards

3. Faculty Development and Resource Optimisation Strategy

Objective: To enhance faculty competencies and optimize PE resource usage

Activities

1. Organize bi-annual training for PE instructors
2. Establish resource allocation framework
3. Launch peer mentoring system
4. Upgrade 'Physical Training' to 'Digital Fitness and Sustainable Exercise' module
5. Implement tasks on carbon reduction and energy tracking in micro-marathons (30% course weight)

KPIs:

1. 90% of faculty trained
2. Resource plan implemented
3. At least 10 mentor-mentee pairs established
4. New module adopted with practical sustainability tasks in 3 departments
5. Task implementation contributes 30% to total course assessment

4. Lifelong Learning Empowerment Strategy

Objective: To promote lifelong fitness habits among students

Activities

1. Organize regular campus fitness challenges
2. Provide AI fitness tracking tools
3. Implement wellness awareness activities
4. Enforce AI check-in ≥3 times/year with 20% health index improvement requirement

KPIs:

1. At least 3 challenges/year with 300+ participants
2. 70% of students use AI fitness tools
3. Health index improves by 20% on average

4. Students meeting this requirement receive full marks in extracurricular module

5. Sustainable Funding Strategy

Objective: To diversify funding sources and improve financial resilience

Activities

1. Research and propose alternative funding sources
2. Establish sponsorship agreements
3. Run annual fundraising events
4. Monitor sponsorship income compliance per 'Fund Management Measures

KPIs:

1. 3+ sponsors onboard
2. At least 1 successful fundraising campaign/year
3. External funding increased by 25%
4. Institutions below 20% sponsorship face deductions in next year's PE budget

6. Smart Infrastructure Integration Strategy

Objective: To modernize PE teaching through smart technologies

Activities

1. Install IoT fitness and tracking devices
2. Upgrade digital PE classrooms
3. Train staff in digital tool usage
4. Ensure all new/renovated venues install IoT fitness/tracking systems

KPIs:

1. 100% of targeted devices installed
2. Two digital PE labs operational
3. 80% of staff certified in smart tech use
4. Venues not fully equipped will not pass acceptance inspections

7. Community Partnership Strengthening Strategy

Objective: To build collaborative PE ecosystems with local stakeholders

Activities

1. Partner with local sports organizations
2. Host joint events and competitions
3. Facilitate student PE internships
4. Monitor compliance with community contracts and internship rates per 'Practice Management Measures'

KPIs:

1. 5+ active community partners
2. 3+ joint events held per year
3. 80% internship placement rate
4. Institutions below target lose 10% of next year's sports practice budget

Stage 3: Evaluation of the Feasibility and Adaptability of the Strategy for the Sustainable Development of Physical Education Teaching in Private Colleges in Shaanxi Province

To validate the practicality and contextual suitability of the proposed sustainable development strategy, a structured expert evaluation was conducted. The target group consisted of five distinguished experts from Shaanxi International Business and Trade College and Xi'an Peihua College, each possessing the following qualifications:

More than 15 years of professional experience;

Holding a senior academic or administrative title; and Demonstrated expertise in physical education, sustainable development, talent cultivation, and higher education management in private institutions.

The evaluation form was designed to measure two dimensions: Feasibility and Adaptability

Each component of the strategic framework, including vision, missions, strategic goals, and the seven key strategies, was assessed using a 5-point Likert scale.

Evaluation Results:

Overall Results: The strategy was rated at the highest level for both feasibility (Mean=4.63, S.D.=0.10) and adaptability (Mean=4.65, S.D.=0.08). This indicates strong consensus that the strategic framework is highly appropriate and practically implementable within the context of private colleges in Shaanxi Province.

Component Breakdown:

Vision: Highest level (Feasibility = 4.64, Adaptability = 4.85)

7 Missions: Highest level (Feasibility = 4.63, Adaptability = 4.67)

7 Goals: Highest level (Feasibility = 4.67, Adaptability = 4.61)

Strategy-Specific Findings:

Strategy 1: Policy-Based Enhancement

Feasibility = 4.61, Adaptability = 4.59

Strategy 2: Sustainable Curriculum Reform

Feasibility = 4.68, Adaptability = 4.64

Strategy 3: Faculty Development & Resource Optimisation

Feasibility = 4.68, Adaptability = 4.67, This was the highest-rated strategy in terms of feasibility.

Strategy 4: Lifelong Learning Empowerment, Feasibility=4.61, Adaptability=4.58

Strategy 5: Sustainable Funding Strategy, Feasibility = 4.75, Adaptability = 4.57, This strategy showed the highest feasibility score across all.

Strategy 6: Smart Infrastructure Integration, Feasibility=4.63, Adaptability=4.59

Strategy 7: Community Partnership Strengthening, Feasibility=4.61, Adaptability = 4.55, This was the lowest-rated, though still at the highest level.

Interpretation and Implications: The expert evaluations affirm that the strategy is both contextually relevant and operationally viable, particularly the aspects focusing on faculty development, curriculum reform, and funding mechanisms.

Although all strategies scored at the highest level, the relatively lower ratings for community partnerships suggest a need for further institutional efforts to deepen external engagement and collaboration with local stakeholders.

The consistently low standard deviations (ranging from 0.03 to 0.13) indicate a strong degree of agreement among experts, strengthening the reliability of the evaluation outcomes.

Conclusion: The evaluation in Stage 3 provides robust empirical evidence that the proposed sustainable development strategy for physical education teaching is well-formulated and adaptable to the realities of private colleges in Shaanxi Province. The findings support its adoption as a strategic blueprint for enhancing institutional resilience, educational quality, and alignment with national and international sustainability agendas, including the Healthy China 2030 initiative and the United Nations Sustainable Development Goals (SDGs).

Discussion

1. Discussion of Factor Analysis Results

The factor analysis identified seven core factors as fundamental to the development of a sustainable strategy for physical education (PE) teaching in private colleges in Shaanxi Province: (1) Policy and Governance, (2) Curriculum Design and Innovation, (3) Faculty Development and Professional Training, (4) Student Engagement and Lifelong Learning, (5) Financial Sustainability and Resource Allocation, (6) Infrastructure and Technology Integration, and (7) Community Collaboration and Industry Partnerships.

These factors represent a synthesis of both theoretical foundations and empirical findings. In particular, Wang Shuying (2012) and Chen Mingqing et al. (2024) emphasised that robust PE policy and governance systems are essential for advancing sustainable sports education. Their studies highlighted the importance of establishing cohesive institutional frameworks, legal structures, and administrative capacities that enable the formulation, implementation and monitoring of strategic plans in school sports. These conclusions directly support the inclusion of Policy and Governance as a strategic cornerstone in the current study.

In the area of Curriculum Design and Innovation, prior research by Zhang Xiqian (2007) and Yuan Shaohui (2014) underscored the need for curriculum

transformation through the integration of interdisciplinary knowledge, particularly health, environmental and technological education. This aligns with the present study's strategic emphasis on modernising PE instruction to reflect evolving educational priorities and student needs.

The findings related to Faculty Development and Professional Training are consistent with studies conducted by Shao Linhai (2016) and Lv Xiaoying (2022), who argued that the long-term quality of PE instruction depends significantly on systematic teacher development and ongoing capacity-building. Their work reinforces the current study's proposal to invest in professional development as a central mechanism for achieving institutional sustainability and instructional excellence.

Regarding Student Engagement and Lifelong Learning, the importance of fostering lifelong physical activity habits was strongly supported by Du Guangyou (2014) and Liu Zhuo (2017). They asserted that PE programmes must go beyond skill instruction to cultivate intrinsic motivation and healthy lifestyles. This validates the study's focus on student-centred strategies aimed at building sustainable behavioural patterns among learners.

Furthermore, the final three factors, Financial Sustainability, Infrastructure and Technology Integration, and Community Collaboration, highlight the increasing need for adaptive, future-oriented systems. Studies by Yuan Ye (2022) and Zhang Yu & Chen Jiahui (2023) stress the significance of digital transformation, data-driven decision-making and strategic partnerships with local communities and industries. These insights support the inclusion of smart technologies and collaborative networks as essential to the future resilience of PE programmes.

Collectively, these factor findings validate the strategic direction of the present research. They confirm that the proposed elements are both academically substantiated and practically feasible, offering a coherent framework for guiding institutional development. Importantly, the strategy aligns not only with national priorities, such as the Healthy China 2030 policy, but also with international commitments, particularly the United Nations Sustainable Development Goals (UNESCO, 2015). As such, this framework holds significant value for policy-makers,

administrators and educators seeking to implement sustainable and high-impact PE systems within the private higher education sector.

2. Discussion of Survey Results: Current Situation, Needs, and Strategic Implications

The survey of 200 stakeholders from private colleges in Shaanxi Province yielded critical insights into both the present conditions and anticipated needs for the sustainable development of physical education (PE) teaching. The results revealed a marked discrepancy between the current implementation status ($\bar{x}$=3.52) and the desired future state ($\bar{x}$=4.68), reflecting a substantial developmental gap that necessitates urgent strategic intervention.

Among the seven evaluated factors, Faculty Development and Professional Training received the highest rating in the current state ($\bar{x}$=3.87). This suggests that mechanisms for continuous professional growth are relatively well established in private institutions. The finding is consistent with the work of Lv Xiaoying (2022) and Shao Linhai (2016), who highlighted the direct correlation between systematic faculty development and the improvement of teaching quality, instructional innovation, and long-term institutional resilience in PE.

In contrast, Infrastructure and Technology Integration was assessed at the lowest level ($\bar{x}$=3.33), pointing to significant limitations in the availability and use of smart PE facilities and digital tools. This observation resonates with the findings of Zhang Yu and Chen Jiahui (2023), who argued that many private colleges in China still face technological underdevelopment, resulting in fragmented learning environments and reduced student engagement.

The analysis of stakeholders' expectations showed a clear shift in priority. Financial Sustainability and Resource Allocation was rated the highest among future needs ($\bar{x}$=4.84), indicating stakeholders' strong concern regarding the adequacy and stability of funding mechanisms. The $PNI_{modified}$ score of 0.52, the highest among all factors, underscores the urgency of addressing financial constraints as a critical leverage point for driving sustainable reform. These concerns are echoed in the work of Chen Mingqing et al. (2024), who identified inconsistent funding streams as a major

systemic challenge that hinders the implementation of long-term PE strategies in non-public institutions.

Community Collaboration and Industry Partnerships also emerged as a high-priority area, with a $PNI_{modified}$ score of 0.46. This reflects growing recognition of the importance of fostering external networks to extend the impact of physical education beyond the institutional setting. As emphasised by Du Guangyou (2014), community engagement and inter-organisational partnerships not only enhance resource mobilisation but also contribute to creating a lifelong culture of physical activity among students and the broader public.

Conversely, Faculty Development and Professional Training registered the smallest priority gap ($PNI_{modified}$=0.19), indicating its status as an existing institutional strength. This suggests it can function as a strategic foundation to support broader initiatives, such as curriculum innovation, infrastructure upgrading, and digital integration.

In summary, the survey results underscore the multi-dimensional nature of sustainable PE development and the need for a balanced strategic approach. On one hand, critical gaps such as funding, infrastructure, and external collaboration must be addressed systematically. On the other, existing assets like faculty competence should be strengthened and strategically leveraged. These findings provide robust empirical evidence that directly inform the next stage of strategy formulation, ensuring that proposed initiatives are not only responsive to stakeholder needs but also grounded in institutional realities and aligned with both national and international policy frameworks, such as Healthy China 2030 and the UN Sustainable Development Goals.

3. Discussion of the Developed Sustainable Strategies

The formulation of seven sustainable strategies for physical education (PE) teaching in private colleges in Shaanxi Province represents a systematic and evidence-based response to institutional needs, policy gaps, and long-term development goals. Rooted in a rigorous TOWS Matrix analysis, the strategies were designed to capitalise on institutional strengths, mitigate internal weaknesses, and

respond effectively to external opportunities and threats. Each strategy is further operationalised through dedicated projects, measurable activities, and Key Performance Indicators (KPIs), thereby ensuring strategic coherence and implementation feasibility.

Policy-Based Enhancement Strategy

This strategy addresses the alignment of institutional frameworks with national educational and health policies, particularly the Healthy China 2030 agenda. Drawing from internal strategic readiness (S1.4) and the advantage of policy support (O1.1), this approach seeks to institutionalise sustainability principles through systematic policy review, compliance mechanisms, and professional development. Its formulation resonates with the arguments of Wang Shuying (2012) and Chen Mingqing et al. (2024), who emphasised the foundational role of policy architecture in shaping resilient PE systems. Its contribution directly supports SDG 3 by embedding health promotion and management structures into higher education policy.

Lifelong Learning Empowerment Strategy

Rooted in high student motivation and readiness for smart fitness engagement (S4.2, S4.5, O4.1, O6.4), this strategy promotes sustained physical activity through digital tools, wellness programmes, and behavioural reinforcement. Consistent with Du Guangyou (2014), the approach fosters lifelong fitness habits, a cornerstone of preventive health and sustainable well-being. It operationalises AI-based tracking and fitness benchmarks to reinforce student accountability. The strategy clearly aligns with SDG 3's target to "ensure healthy lives and promote well-being for all at all ages".

Sustainable Curriculum Reform Strategy

This strategy confronts structural curriculum weaknesses (W2.2, W2.5) by integrating emerging technologies and sustainability content, while leveraging student interest and digital advancements (O4.1, O6.5). It is grounded in the work of Zhang Xiqian (2007) and Yuan Shaohui (2014), who advocated for the embedding of health literacy, technology integration, and interdisciplinary teaching in PE. Through revised modules, pilot programmes, and compliance with the Sports Curriculum

Management Measures, this strategy enhances curriculum relevance and learning engagement.

Faculty Development and Resource Optimisation Strategy

Addressing both capacity-building and efficiency (S3.1, S5.3), this strategy reinforces institutional resilience by investing in faculty development and optimal resource use. Supported by Shao Linhai (2016) and Lv Xiaoying (2022), who emphasised the centrality of professional development to quality PE instruction, the strategy enhances pedagogical competence and embeds sustainability within instructional practices. It also includes innovative elements such as energy-tracking tasks in PE assessments, reinforcing climate-conscious behavioural education consistent with the broader sustainability agenda.

Sustainable Funding Strategy

This strategy responds to acute financial limitations (W5.2) and emerging opportunities for funding diversification (O5.4, O5.5). As highlighted by Chen Mingqing et al. (2024), many private colleges suffer from irregular and insufficient funding for PE development. This strategy introduces multi-source financing mechanisms, including sponsorships, fundraising campaigns, and financial compliance audits. It directly contributes to the economic sustainability of PE programmes, ensuring continuity and institutional independence while supporting long-term health promotion.

Smart Infrastructure Integration Strategy

Designed to overcome deficiencies in technology adoption (W6.2), this strategy introduces Internet of Things (IoT) fitness devices, smart classrooms, and digital skill training for faculty (O6.4, O6.5). Zhang Yu and Chen Jiahui (2023) noted the transformative potential of digital environments in PE education. This strategy not only modernises physical learning spaces but also enhances real-time monitoring, learning analytics, and student engagement. It supports digital transformation goals in education while promoting physical well-being.

Community Partnership Strengthening Strategy

This strategy addresses limited community engagement (W4.3) and the external threat of institutional isolation (T7.2, T7.5). By fostering partnerships with sports organisations, providing internship opportunities, and hosting collaborative events, the strategy extends the reach and relevance of PE beyond the institutional setting. Liu Zhuo (2017) noted that meaningful community integration is essential for the success of PE programmes, contributing to inclusive participation and social sustainability.

Strategic Coherence with National and Global Agendas

Together, these seven strategies constitute a comprehensive strategic framework that is pedagogically sound, technologically adaptive, financially feasible, and socially responsive. They are fully aligned with China's national goals for higher education reform and the promotion of public health, as well as with SDG 3, which prioritises inclusive access to health-promoting education and lifelong physical activity. Furthermore, the incorporation of measurable KPIs and performance-based implementation ensures institutional accountability, stakeholder engagement, and long-term impact.

This strategic framework does not only serve as a roadmap for institutional enhancement but also as a scalable model that can be adapted by other private colleges in similar developmental contexts. It reflects a synthesis of stakeholder input, empirical evidence, and strategic foresight, offering a meaningful contribution to the literature and practice of sustainable development in education.

4. Discussion of the Evaluation Results on Feasibility and Adaptability

The evaluation results from Stage 3 of the study provide compelling evidence of the strategic framework's relevance, quality and practicality. The experts involved, each highly experienced in physical education, higher education governance and sustainable development, reached a strong consensus that the proposed strategies are both adaptable to the local context of private colleges in Shaanxi Province and feasible for implementation. This validation reinforces the credibility of the strategic

design and underscores its potential to guide institutional transformation in alignment with national and international development agendas.

Of particular significance was the high expert endorsement of the Faculty Development and Resource Optimisation Strategy, which was recognised as a central pillar of sustainability in PE teaching. This finding aligns closely with the work of Lv Xiaoying (2022) and Shao Linhai (2016), who emphasised the importance of continuous professional development and effective resource allocation in driving long-term improvements in instructional quality. Their research supports the assertion that faculty capacity is not merely a supportive factor but a foundational driver of sustainable educational change, especially in under-resourced institutional settings.

Similarly, the Sustainable Curriculum Reform Strategy was assessed as highly suitable and implementable, affirming the growing consensus in the literature that modern PE curricula must be technology-integrated, student-centred and focused on holistic health education. Scholars such as Zhang Xiqian (2007) and Yuan Shaohui (2014) have long advocated for interdisciplinary curriculum design that incorporates digital tools, environmental awareness and health literacy. The positive evaluation of this strategy reflects its alignment with contemporary pedagogical expectations and its capacity to engage learners in meaningful, future-oriented PE experiences.

The Sustainable Funding Strategy also received robust expert support, particularly in terms of its feasibility. This is consistent with the findings of Chen Mingqing et al. (2024), who highlighted that financial instability remains a chronic barrier to sustainable PE development in private institutions. The expert recognition of funding as a critical enabler of strategic continuity affirms the necessity of diversified financial models, including sponsorships, partnerships and fundraising mechanisms, to reduce dependence on limited internal resources.

Notably, the Community Partnership Strengthening Strategy, although receiving comparatively lower scores, was still deemed highly valid and implementable. This result suggests a broader acceptance of its value, albeit with recognition of potential operational challenges. As Liu Zhuo (2017) argued, building

effective community partnerships in education requires sustained coordination, mutual trust and long-term engagement. While the strategy is well-conceived, its implementation may depend on developing institutional mechanisms that support inter-organisational collaboration and external stakeholder alignment.

Importantly, the consistency in expert ratings across all strategies, with low standard deviation, indicates a high degree of inter-rater agreement. This consistency strengthens the empirical foundation of the strategy evaluation and suggests that the proposed directions are not only theoretically coherent but also practically actionable within the higher education landscape of Shaanxi Province.

In essence, the expert evaluation confirms that the strategic framework is both conceptually sound and institutionally grounded. It addresses the structural, pedagogical, financial and community-related dimensions of sustainable PE teaching. The strong performance of strategies related to faculty development, curriculum innovation and funding sustainability illustrates the urgent and interrelated challenges that private colleges face in promoting health and well-being through education. This objective is clearly aligned with Sustainable Development Goal 3 (Good Health and Well-being) and the national Healthy China 2030 policy.

In conclusion, the evaluation results in Stage 3 affirm the strategic readiness of the proposed framework. They validate the importance of linking institutional strengths to realistic development pathways, thereby providing a reliable foundation for policy implementation and institutional improvement. This research contributes not only to the body of knowledge on education for sustainable development but also offers a practical, expert-validated model for advancing quality, equity and health outcomes through PE teaching in the private higher education sector.

Summary of the Overall Discussion

The findings of this study confirm the strategic significance and practical applicability of the proposed sustainable development strategy for physical education (PE) teaching in private colleges in Shaanxi Province. Drawing upon empirical evidence from stakeholder surveys, expert evaluations and comprehensive strategy design, the discussion highlights critical areas for institutional advancement

aligned with both national priorities and international frameworks such as Healthy China 2030 and the United Nations Sustainable Development Goals (SDG 3).

The survey results revealed a substantial gap between the current state and the expected aspirations for sustainable PE development, particularly in areas such as funding, infrastructure and community collaboration. These gaps underscore the urgency for strategic intervention while also identifying faculty development as an existing institutional strength. The interpretation of these findings was consistent with previous studies, reaffirming the need for a balanced approach that addresses both high-priority deficiencies and institutional assets.

The development of seven sustainable strategies, grounded in TOWS Matrix analysis, was shown to be well-aligned with contextual realities. Each strategy was constructed with clear objectives, measurable activities and key performance indicators. They address essential domains such as policy reform, curriculum innovation, professional training, student engagement, financial sustainability, digital transformation and community partnership.

The expert evaluation further validated the strategy's overall feasibility and adaptability. Faculty development, curriculum reform and financial resilience emerged as the most robust components, reflecting expert consensus and empirical support. Although community collaboration received slightly lower scores, it remained within a high range, indicating the need for deeper engagement mechanisms rather than a complete redesign.

In summary, the research offers a well-structured, evidence-based and contextually responsive framework for the sustainable development of PE teaching in private colleges. It contributes not only to the academic discourse on education for sustainable development but also provides practical guidance for institutional leaders, policy-makers and educators seeking to strengthen the role of physical education in promoting long-term health, equity and quality in higher education.

Recommendations

1. Recommendations from This Study

1.1 Private colleges should strengthen faculty development initiatives to enhance teaching quality, research capacity and curriculum innovation in line with sustainable development objectives.

1.2 Institutions should implement student-centred PE programmes that integrate health promotion, digital tools and sustainability principles to foster lifelong physical literacy.

1.3 Educational administrators and policymakers are advised to adopt the proposed strategic framework as a reference for formulating regional PE development policies.

1.4 Institutions should improve infrastructure and resource allocation to support the effective delivery of sustainable PE programmes.

1.5 Colleges should establish mechanisms to foster long-term partnerships with local communities and the sports industry to extend the impact of physical education beyond the campus.

2. Recommendations for Future Research

2.1 Future studies should examine the long-term effects of sustainable PE strategies on student outcomes and institutional sustainability.

2.2 Comparative research across provinces or between public and private institutions is recommended to assess the adaptability of the proposed strategies.

2.3 Mixed-method research is encouraged to capture in-depth stakeholder perceptions and contextual challenges in strategy implem

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Appendices

Appendix A

List of Specialists and Letters of Specialists Invitation for IOC Verification

List of Specialists Invitation for IOC Verification

NO.	Name	Position
1	Assistant Professor Dr. Luxana Keyuraphan	Ph.D. Development Education of Bansomdejchaopraya Rajabhat University
2	Assistant Professor Dr. Sahapat Insee	Ph.D. Development Education of Bansomdejchaopraya Rajabhat University
3	Assistant Professor Dr. Sunate Thaveethavornsawat	Ph.D. Technology Management of Bansomdejchaopraya Rajabhat University
4	Liu Wanbin	Professor of Shaanxi University of International Trade & Commerce
5	Wang ZhiQiang	Professor of Xi'an Peihua University

List of Focus Group Interviewees

NO	Workplace	Name	Education and work background
1	Haojing College of Shaanxi University of Science and Technology	Lei Xiuping	Position: Director of the Basic Teaching and Research Office, Department of Physical Education Title: Associate Professor Education: Master Work Experience: 13 Years
2	Haojing College of Shaanxi University of Science and Technology	Zhou Ning	Position: Physical Education Teacher Title: Associate Professor Education: Master Work Experience: 15 Years
3	Xi'an Innovation College of Yan'an University	Zheng Wenhai	Position: Director of the Physical Education Department Title: Professor Education: Master Work Experience: 25 Years
4	The Hi-Tech College of Xi'an University of Technology	Wang Ning	Position: Physical Education Teacher Title: Associate Professor Education: Master Work Experience: 15 years
5	Xi'an Peihua University	Zhang Jinjin	Position: Vice Dean for Teaching Affairs, School of Physical Education Title: Associate Professor Education: Doctor Work Experience: 14 Years
6	Xi'an Peihua University	Du Feng	Position: :Director of the Physical Education Department Title: Associate Professor

NO	Workplace	Name	Education and work background
			Education: Master Work Experience: 15 Years
7	Xi'an International University	Li Yangli	Position: Director of the Sports Center and Vice Chairperson of the University Trade Union Title: Professor Education: Master Work Experience: 18 Years
8	Shaanxi University Of International Trade & Commerce	Zhao Yang	Position: Director Of Physical Education Teaching And Research Office Title: Associate Professor Education: Master Work Experience: 15 Years
9	Shaanxi University Of International Trade & Commerce	Li Weiqiang	Position:Assistant to the Director of the Physical Education Department Title: Professor Education: Master Work Experience: 18 years
10	Xi'an Mingde Institute Of Technology	Zhai Suqin	Position: Director of the Physical Education Teaching and Research Office Title:Associate Professor Education: Master Work Experience: 25 Years
11	Xi'an Haitang Vocational College	Ren Linfeng	Position:Director of the Physical Education Teaching and Research Office Title: Associate Professor Education: Master Work Experience: 15Years

List of Specialists Invitation for Strategies Evaluation

The following list was invited as evaluation experts to evaluate the adaptability and feasibility of the sustainable development strategies for physical education teaching in private colleges in Shaanxi Province.

NO.	Name	Position
1	Jiang Ying	Shaanxi University Of International Trade & Commerce
2	Li Zongling	Haojing College of Shaanxi University of Science and Technology
3	Li Yangli	Xi'an International University
4	Liu LiFeng	Xi'an Peihua University
5	Lyu Jing	Xi'an Peihua University

Appendix B

Official Letter

MHESI 0643.14/ว.2930

Bansomdejchaopraya
Rajabhat University
1061 Soi Itsaraphap 15,
Itsaraphap Road, Hiranruchi,
Thonburi, Bangkok, Thailand
10600

15 October 2024

Subject: Invitation to validate research instrument

Dear

Attachment List of experts who validated the research instrument

Ms.Sun Li is a graduate student in the Doctor of Philosophy Program in Educational Management for Sustainable Development program of Bansomdejchaopraya Rajabhat University. She is conducting research entitled "Development of Sustainable College Counselor's Quality and Promoting Strategy in Shaanxi Province ." under the supervision of the following thesis advisory committee:

1. Associate Professor Dr. Touchakorn Suwancharas	Major Advisor
2. Assistant Professor Dr.Luxana Keyuraphan	Co-Advisor
3.Assistant Professor Dr. Areeya Juicharnlong	Co-Advisor

The thesis advisory committee recognizes your expertise in formulating sustainable development and promotion strategies for enhancing the professional quality of college counselors in Shaanxi Province and believes that your recommendations would be invaluable for the further refinement of this research instrument.

With your specialized knowledge, we kindly request your assistance in validating the attached research instrument. In this regard, we would like to take this opportunity to express our deepest gratitude and appreciation for your support.

Yours faithfully

(Asst. Prof. Dr.Tanaput Chancharoen)
Vice Dean of Graduate School for Dean of Graduate School

Tel.+662-473-7000
www.bsru.ac.th
E-mail: academic.grad@bsru.ac.th

MHESI 0643.14/ว.2731

Bansomdejchaopraya
Rajabhat University
1061 Soi Itsaraphap 15,
Itsaraphap Road, Hiranruchi,
Thonburi, Bangkok, Thailand
10600

15 October, 2024

Subject Invitation to participate in the strategic assessment as an expert

Dear

Attachment list of Specialists for Strategies Evaluation

Ms. Liang Fangmei is a graduate student in the Doctor of Philosophy Program in Educational Management for Sustainable Development program of Bansomdejchaopraya Rajabhat University. She is conducting research entitled "Development of sustainable strategy of physical education teaching in private colleges in Shaanxi Province." under the supervision of the following thesis advisory committee:

1. Associate Professor Dr. Touchakorn Suwancharas Major Advisor
2. Assistant Professor Dr.Luxana Keyuraphan Co-Advisor
3. Assistant Professor Dr. Areeya juichamlong Co-Advisor

The primary focus of this research is to formulate sustainable development strategies of physical education in private colleges in Shaanxi Province. In light of your expertise in this area, the Graduate School cordially invites you to serve as an expert reviewer for the in-depth examination of the strategies under consideration and to provide feedback on these strategies. Your insights will be instrumental in promoting sustainable development strategies of physical education in private colleges in Shaanxi Province.We sincerely value your time and consideration of this request.

Thank you for your kind considerations.

Yours faithfully

(Asst. Prof. Dr.Tanaput Chancharoen)
Vice Dean of Graduate School for Dean of Graduate School

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MHESI 0643.14/ว. ๒๗๖๑

Bansomdejchaopraya
Rajabhat University
1061 Soi Itsaraphap 15,
Itsaraphap Road, Hiranruchi,
Thonburi, Bangkok, Thailand
10600

15 October, 2024

Subject Invitation to join a focus group discussion as an expert

Dear

Attachment List of experts for Focus Group Interviewees

Ms.Liang Fangmei is a graduate student in the Doctor of Philosophy Program in Educational Management for Sustainable Development program of Bansomdejchaopraya Rajabhat University. She is conducting research entitled "Development of sustainable strategy of physical education teaching in private colleges in Shaanxi Province." under the supervision of the following thesis advisory committee:

1.Associate Professor Dr. Touchakorn Suwancharas	Major Advisor
2. Assistant Professor Dr.Luxana Keyuraphan	Co-Advisor
3.Assistant Professor Dr. Areeya juichamlong	Co-Advisor

The thesis advisory committee, along with the student, recognizes your expertise in promoting sustainable development strategies of physical education in private colleges in Shaanxi Province. As such, the graduate school would like to formally invite you to join a focus group discussion as an expert, where your insights and suggestions will greatly contribute to the advancement of the student's research.

Thank you for considering this invitation.

Yours faithfully

(Asst. Prof. Dr.Tanaput Chancharoen)
Vice Dean of Graduate School for Dean of Graduate School

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E-mail: academic.grad@bsru.ac.th

Appendix C

Research Instrument

Questionnaire on sustainable development strategy of Physical Education Teaching in Private Colleges in Shaanxi Province

Introduction:

This questionnaire aims to assess the internal and external factors influencing physical education (PE) teaching in private colleges in Shaanxi Province. It is designed for various stakeholder groups, including PE teachers, sports administrators, sports specialists, and Course leaders.

Questionnaire on the Sustainable Development Strategy of Physical Education Teaching in Private Colleges in Shaanxi Province.

Instructions:

- Please rate each statement using a 5-point Likert scale:
  (1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree).
- Kindly respond based on your own experiences and perspectives.

Part I: Respondent Identity (Personal Information)

1. **Role:**

☐ Physical Education Teacher

☐ Sports administrators

☐ College Administrator

☐ Sports Specialist

☐Course Leader

2. **Years of Experience in Physical Education or Related Field:**

☐ Less than 1 year

☐ 1-5 years

☐ 6-10 years

☐ More than 10 years

3. **Institution/Organization Type:**

☐ Private College

☐ Government Agency

☐ Private Sector

☐ NGO/Sports Federation

☐ Other (Please specify) _____

Part 2 Questionnaire

Please read each of the following items carefully and respond truthfully based on your actual situation and experience. Use the 5-point Likert scale to indicate your level of agreement:

(1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree)

NO	Statements	Current situations					Expected situations				
		5	4	3	2	1	5	4	3	2	1
Policy and Governance											
1	Current institutional policies effectively support sustainable physical education (PE) teaching in private colleges.										
2	Institutional policies provide clear guidance for the development of the PE curriculum and teacher professional development.										
3	Government agencies play an effective role in monitoring and enhancing the quality of PE teaching in private colleges.										
4	The school has developed a clear and strategic plan for the advancement of physical education.										

NO	Statements	Current situations					Expected situations				
		5	4	3	2	1	5	4	3	2	1
5	The school regularly evaluates the effectiveness of physical education policy implementation.										
Curriculum Design and Innovation											
6	The current PE curriculum is relevant to students' physical and mental well-being.										
7	Principles of sustainability and lifelong fitness are effectively integrated into the PE curriculum.										
8	Digital learning tools (e.g., fitness apps, virtual PE classes) are effectively integrated into PE instruction										
9	The PE curriculum is regularly updated to reflect technological advancements in education and sports science.										
10	The curriculum supports long-term student engagement in physical activity.										
Faculty Development and Professional Training											
11	PE teachers regularly receive training in modern teaching methods and educational technologies.										
12	PE teachers are well trained in integrating sustainability concepts into teaching.										
13	Faculty members actively participate in off-campus academic exchange programs.										
14	Faculty development significantly contributes to the overall quality of PE education.										
15	"The teaching methodologies currently used in PE effectively engage students."										

NO	Statements	Current situations					Expected situations				
		5	4	3	2	1	5	4	3	2	1
Student Engagement and Lifelong Learning											
16	Students demonstrate strong interest in PE classes and extracurricular sports activities.										
17	Current teaching methods effectively promote lifelong fitness habits.										
18	A sufficient variety of extracurricular sports activities is available to maintain student engagement.										
19	Students recognize the importance of PE for their overall well-being.										
20	The PE program effectively prepares students for maintaining lifelong fitness independently.										
Financial Sustainability and Resource Allocation											
21	Funding for PE instruction in private colleges is sufficient to meet program requirements.										
22	Financial support effectively covers PE program needs, such as equipment and facilities.										
23	Funding is appropriately allocated for PE faculty development and training.										
24	Financial challenges have a significant impact on the sustainability of PE instruction in private colleges.										
25	Alternative funding models could be explored to support PE education.										
Infrastructure and Technology Integration											
26	Sports facilities for PE instruction in private colleges are sufficient to meet instructional needs.										

NO	Statements	Current situations					Expected situations				
		5	4	3	2	1	5	4	3	2	1
27	Modern sports technologies are effectively integrated into the PE curriculum.										
28	Sports facilities are regularly upgraded and properly maintained.										
29	Smart fitness devices and AI-driven tools effectively support PE learning.										
30	Technological innovations enhance the overall effectiveness of PE instruction.										
Community Collaboration and Industry Partnerships											
31	Students are offered internships or training opportunities to work in professional sports organizations.										
32	Private colleges regularly organize community-based sports programs.										
33	Strengthening community collaboration is important for promoting the sustainability of PE programs.										
34	Community cooperation plays an important role in enhancing the social impact of PE instruction.										
35	Private colleges collaborate effectively with local sports clubs and community organizations.										

Part 3: Additional Suggestions

This section consists of open-ended questions designed to gather qualitative input to support the development of a strategic framework.

1.In your opinion, which of the 35 questionnaire items across the seven dimensions represent external factors that are beyond the control or direct management of the university? (Please specify.)

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2.Please provide any suggestions that may contribute to the development of the proposed strategy.

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3.Other recommendations (please specify):

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.....

Validity Evaluation Form of Questionnaire on the Sustainable Development Strategy of Physical Education Teaching in Private Colleges in Shaanxi Province

Research Title: Development of Sustainable Strategy of Physical Education Teaching in Private Colleges in Shaanxi Province

Research Purposes:

1. To study the current and expected situation of sustainable development of physical education teaching in private colleges in Shaanxi Province.

2. To develop strategies to influence the sustainable development of physical education teaching in private colleges in Shaanxi Province.

3.To evaluate the suitability and feasibility of strategy for the sustainable development of physical education teaching in private colleges in Shaanxi Province.

Assessor's Name:_____.

Job Title/Position:_____.

Work Unit:_____.

Years of Work Experience:_____.

When using the questionnaire, please evaluate whether the contents in the questionnaire about the actual perception of Shaanxi private college teachers on the sustainable development strategy of Physical Education Teaching in Shaanxi private colleges are consistent.After the evaluation, please tick the corresponding box. Please evaluate according to the following criteria: -1 = does not match the definition, 0 = not sure whether it meets the definition, +1 = corresponds to the definition.

NO	Assessment Items	Evaluation result		
		-1	0	1
Policy and Governance				
1	Current institutional policies effectively support sustainable physical education (PE) teaching in private colleges.			
2	Institutional policies provide clear guidance for the development of the PE curriculum and teacher professional development.			
3	Government agencies play an effective role in monitoring and enhancing the quality of PE teaching in private colleges.			
4	The school has developed a clear and strategic plan for the advancement of physical education.			
5	The school regularly evaluates the effectiveness of physical education policy implementation.			
Curriculum Design and Innovation				
6	The current PE curriculum is relevant to students' physical and mental well-being.			
7	Principles of sustainability and lifelong fitness are effectively integrated into the PE curriculum.			
8	Digital learning tools (e.g., fitness apps, virtual PE classes) are effectively integrated into PE instruction			
9	The PE curriculum is regularly updated to reflect technological advancements in education and sports science.			
10	The curriculum supports long-term student engagement in physical activity.			
Faculty Development and Professional Training				
11	PE teachers regularly receive training in modern teaching methods and educational technologies.			
12	PE teachers are well trained in integrating sustainability concepts into teaching.			

NO	Assessment Items	Evaluation result		
		-1	0	1
13	Faculty members actively participate in off-campus academic exchange programs.			
14	Faculty development significantly contributes to the overall quality of PE education.			
15	The teaching methodologies currently used in PE effectively engage students.			
Student Engagement and Lifelong Learning				
16	Students demonstrate strong interest in PE classes and extracurricular sports activities.			
17	Current teaching methods effectively promote lifelong fitness habits.			
18	A sufficient variety of extracurricular sports activities is available to maintain student engagement.			
19	Students recognize the importance of PE for their overall well-being.			
20	The PE program effectively prepares students for maintaining lifelong fitness independently.			
Financial Sustainability and Resource Allocation				
21	Funding for PE instruction in private colleges is sufficient to meet program requirements.			
22	Financial support effectively covers PE program needs, such as equipment and facilities.			
23	Funding is appropriately allocated for PE faculty development and training.			
24	Financial challenges have a significant impact on the sustainability of PE instruction in private colleges.			
25	Alternative funding models could be explored to support PE education.			

NO	Assessment ltems	Evaluation result		
		-1	0	1
Infrastructure and Technology Integration				
26	Sports facilities for PE instruction in private colleges are sufficient to meet instructional needs.			
27	Modern sports technologies are effectively integrated into the PE curriculum.			
28	Sports facilities are regularly upgraded and properly maintained.			
29	Smart fitness devices and AI-driven tools effectively support PE learning.			
30	Technological innovations enhance the overall effectiveness of PE instruction.			
Community Collaboration and Industry Partnerships				
31	Students are offered internships or training opportunities to work in professional sports organizations.			
32	Private colleges regularly organize community-based sports programs.			
33	Strengthening community collaboration is important for promoting the sustainability of PE programs.			
34	Community cooperation plays an important role in enhancing the social impact of PE instruction.			
35	Private colleges collaborate effectively with local sports clubs and community organizations.			

Signature:_____.

Date: _____.

Interview Outline Effectiveness Evaluation Form for Sustainable Development Strategy of Physical Education Teaching in Private Colleges in Shaanxi Province

Research Title: Development of Sustainable Strategy of Physical Education Teaching in Private Colleges in Shaanxi Province Research

Purposes:

1. To study the current and expected situation of sustainable development of physical education teaching in private colleges in Shaanxi Province.

2. To develop strategies to influence the sustainable development of physical education teaching in private colleges in Shaanxi Province.

3. To evaluate the suitability and feasibility of strategy for the sustainable development of physical education teaching in private colleges in Shaanxi Province.

When using the interview, please evaluate whether the interview is correct about the sustainable development strategy of Physical Education Teaching in Private Colleges in Shaanxi Province. After evaluation, please tick the corresponding box. Please evaluate according to the following criteria: -1 = does not match the definition, 0 = not sure whether it meets the definition, +1 = corresponds to the definition.

Content	Questions	Evaluation result		
		-1	0	1
Policy and Governance	1. In view of the current situation of the sustainable development of Physical Education Teaching in private colleges in Shaanxi Province, what strategies should these colleges adopt to promote the sustainable development of their Physical Education Teaching?			
Curriculum Design and Innovation	2. In view of the current situation of the sustainable development of Physical Education Teaching in private colleges in Shaanxi Province, what strategies should these colleges adopt to promote the sustainable development of their Physical Education Teaching?			
Faculty Development and Professional Training	3.In view of the current situation of the sustainable development of Physical Education Teaching in private colleges in Shaanxi Province, what strategies should these colleges adopt to promote the sustainable development of their Physical Education Teaching?			
Student Engagement and Lifelong Learning	4.In view of the current situation of the sustainable development of Physical Education Teaching in private colleges in Shaanxi Province, what strategies should these colleges adopt to promote the sustainable development of their Physical Education Teaching?			
Financial Sustainability	5.In view of the current situation of the sustainable development of Physical Education Teaching in			

Content	Questions	Evaluation result		
		-1	0	1
and Resource Allocation	private colleges in Shaanxi Province, what strategies should these colleges adopt to promote the sustainable development of their Physical Education Teaching?			
Infrastructure and Technology Integration	6.In view of the current situation of the sustainable development of Physical Education Teaching in private colleges in Shaanxi Province, what strategies should these colleges adopt to promote the sustainable development of their Physical Education Teaching?			
Community Collaboration and Industry Partnerships	7.In view of the current situation of the sustainable development of Physical Education Teaching in private colleges in Shaanxi Province, what strategies should these colleges adopt to promote the sustainable development of their Physical Education Teaching?			

Suggestions

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.....

Sign.....Assessor

(.....)

Date...../...../.....

Evaluation Form for Sustainable development strategies of physical education teaching in private colleges in Shaanxi Province

Direction:

1. This questionnaire validity evaluation form was prepared by experts to consider the consistency of the questionnaire and make suggestions. It is part of the doctoral dissertation of Educational Management at Bansongdechaopraya Rajabhat University, Thailand. This study aims to explore the components of improving the sustainable development of physical education teaching in private colleges in Shaanxi Province, formulate strategies to enhance the sustainable development of physical education teaching in these institutions, and evaluate the effectiveness of these strategies.

2. This questionnaire validity evaluation form focuses on 7 aspects and covers all strategies.

3. Your comments on the interview validity evaluation form will help to formulate strategies for the sustainable development of physical education teaching in private colleges in Shaanxi Province. Answering this questionnaire will not have any impact on you personally. The data provided will be an overview, and the researcher intends to use the data for research purposes only.

Thank you for your cooperation in answering this validity evaluation form.

Ms.Liang Fangmei
Bansomdejchaopraya Rajabhat University

Instruction:

The tool used this time is a questionnaire to evaluate strategies for the sustainable development of physical education teaching in private colleges in Shaanxi Province.

Please consider the questionnaire to evaluate all aspects of strategies for the sustainable development of physical education teaching in private colleges in Shaanxi Province.

Please check each comment box, the score is as follows:

5 indicates the highest adaptability and feasibility.

4 indicates high adaptability and feasibility.

3 indicates average adaptability and feasibility.

2 indicates low adaptability and feasibility.

1 indicates the lowest adaptability and feasibility.

Evaluation checklist	Feasibility					Adaptability				
	5	4	3	2	1	5	4	3	2	1
Policy-Based Enhancement Strategy										
1. Review and analyze existing PE policies										
2. Conduct policy development workshops										
3. Formulate and approve strategic action plans										
4. Update institutional PE policies in accordance with national administrative measures										
5. Organize annual training sessions to disseminate updated policies and evaluation criteria										
6. Monitor policy compliance; apply sanction measures for non-compliance										

Evaluation checklist	Feasibility					Adaptability				
	5	4	3	2	1	5	4	3	2	1
Sustainable Curriculum Reform Strategy										
1. Revise existing PE curriculum										
2. Integrate digital fitness and sustainability content										
3. Pilot the new curriculum in 3 departments										
4. Align new modules with 'Sports Curriculum Management Measures' and compliance standards										
Faculty Development & Resource Optimization Strategy										
1. Organize bi-annual training for PE instructors										
2. Establish resource allocation framework										
3. Launch peer mentoring system										
4.Upgrade 'Physical Training' to 'Digital Fitness and Sustainable Exercise' module										
5.Implement tasks on carbon reduction and energy tracking in micro-marathons (30% course weight)										
Lifelong Learning Empowerment Strategy										
1.Organize regular campus fitness challenges										
2. Provide AI fitness tracking tools										
3. Implement wellness awareness activities										
4. Enforce AI check-in ≥3 times/year with 20% health index improvement requirement										
Sustainable Funding Strategy										
1. Research and propose alternative funding sources										
2. Establish sponsorship agreements										
3. Run annual fundraising events										

Evaluation checklist	Feasibility					Adaptability				
	5	4	3	2	1	5	4	3	2	1
4. Monitor sponsorship income compliance per 'Fund Management Measures										
Smart Infrastructure Integration Strategy										
1. Install IoT fitness and tracking devices										
2. Upgrade digital PE classrooms										
3. Train staff in digital tool usage										
4. Ensure all new/renovated venues install IoT fitness/tracking systems										
Community Partnership Strengthening Strategy										
1. Partner with local sports organizations										
2. Host joint events and competitions										
3. Facilitate student PE internships										
4. Monitor compliance with community contracts and internship rates per 'Practice Management Measures'										

Suggestions

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Sign.....Assessor

(.....)

Date...../...../.....

Appendix D

The Results of the Quality Analysis of Research Instruments

The Quality Analysis Results of Research Instruments

Consistency evaluation results of the questionnaire survey on sustainable development strategies for physical education teaching in private colleges in Shaanxi Province.

1. Quality analysis results of the sustainable development strategy questionnaire for physical education teaching.

clause	The Current Situation of Sustainable Development in Physical Education Teaching in Private colleges in Shaanxi Province	Experts					IOC	Conclusion
		1	2	3	4	5		
Policy and Governance								
1	Current institutional policies effectively support sustainable physical education (PE) teaching in private colleges.	1	1	1	1	1	1.00	consistent
2	Institutional policies provide clear guidance for the development of the PE curriculum and teacher professional development.	1	1	-1	1	1	0.80	consistent
3	Government agencies play an effective role in monitoring and enhancing the quality of PE teaching in private colleges.	1	1	1	1	1	1.00	consistent
4	The school has developed a clear and strategic plan for the advancement of physical education.	1	1	1	0	1	0.80	consistent
5	The school regularly evaluates the effectiveness of physical education policy implementation.	1	1	1	1	1	1.00	consistent

clause	The Current Situation of Sustainable Development in Physical Education Teaching in Private colleges in Shaanxi Province	Experts					IOC	Conclusion
		1	2	3	4	5		
Curriculum Design and Innovation								
6	The current PE curriculum is relevant to students' physical and mental well-being.	1	1	1	1	1	1.00	consistent
7	Principles of sustainability and lifelong fitness are effectively integrated into the PE curriculum.	1	1	1	1	1	1.00	consistent
8	Digital learning tools (e.g., fitness apps, virtual PE classes) are effectively integrated into PE instruction	1	1	1	1	1	1.00	consistent
9	The PE curriculum is regularly updated to reflect technological advancements in education and sports science.	1	1	1	1	1	1.00	consistent
10	The curriculum supports long-term student engagement in physical activity.	1	1	1	1	1	1.00	consistent
Faculty Development and Professional Training								
11	PE teachers regularly receive training in modern teaching methods and educational technologies.	1	1	1	1	1	1.00	consistent
12	PE teachers are well trained in integrating sustainability concepts into teaching.	1	1	1	1	1	1.00	consistent
13	Faculty members actively participate in off-campus academic exchange programs.	1	1	1	1	1	1.00	consistent
14	Faculty development significantly contributes to the overall quality of PE education.	1	1	1	1	1	1.00	consistent

clause	The Current Situation of Sustainable Development in Physical Education Teaching in Private colleges in Shaanxi Province	Experts					IOC	Conclusion
		1	2	3	4	5		
15	"The teaching methodologies currently used in PE effectively engage students."	1	1	1	1	1	1.00	consistent
Student Engagement and Lifelong Learning								
16	Students demonstrate strong interest in PE classes and extracurricular sports activities.	1	1	1	1	1	1.00	consistent
17	Current teaching methods effectively promote lifelong fitness habits.	1	1	1	1	1	1.00	consistent
18	A sufficient variety of extracurricular sports activities is available to maintain student engagement.	1	1	1	1	1	1.00	consistent
19	Students recognize the importance of PE for their overall well-being.	1	1	1	1	1	1.00	consistent
20	The PE program effectively prepares students for maintaining lifelong fitness independently.	1	1	1	1	1	1.00	consistent
Financial Sustainability and Resource Allocation								
21	Funding for PE instruction in private colleges is sufficient to meet program requirements.	1	1	-1	1	1	0.60	consistent
22	Financial support effectively covers PE program needs, such as equipment and facilities.	1	1	1	1	1	1.00	consistent
23	Funding is appropriately allocated for PE faculty development and training.	1	1	1	1	1	1.00	consistent
24	Financial challenges have a significant impact on the sustainability of PE instruction in private colleges.	1	1	1	1	1	1.00	consistent

clause	The Current Situation of Sustainable Development in Physical Education Teaching in Private colleges in Shaanxi Province	Experts					IOC	Conclusion
		1	2	3	4	5		
25	Alternative funding models could be explored to support PE education.	1	1	1	1	1	1.00	consistent
Infrastructure and Technology Integration								
26	Sports facilities for PE instruction in private colleges are sufficient to meet instructional needs.	1	1	1	1	1	1.00	consistent
27	Modern sports technologies are effectively integrated into the PE curriculum.	1	1	1	1	1	1.00	consistent
28	Sports facilities are regularly upgraded and properly maintained.	1	1	1	1	1	1.00	consistent
29	Smart fitness devices and AI-driven tools effectively support PE learning.	1	0	1	0	1	0.60	consistent
30	Technological innovations enhance the overall effectiveness of PE instruction.	1	1	1	1	1	1.00	consistent
Community Collaboration and Industry Partnerships								
31	Students are offered internships or training opportunities to work in professional sports organizations.	1	1	1	1	1	1.00	consistent
32	Private colleges regularly organize community-based sports programs.	1	1	1	1	1	1.00	consistent
33	Strengthening community collaboration is important for promoting the sustainability of PE programs.	1	1	1	1	1	1.00	consistent
34	Community cooperation plays an important role in enhancing the social impact of PE instruction.	1	1	1	1	1	1.00	consistent

clause	The Current Situation of Sustainable Development in Physical Education Teaching in Private colleges in Shaanxi Province	Experts					IOC	Conclusion
		1	2	3	4	5		
35	Private colleges collaborate effectively with local sports clubs and community organizations.	1	1	1	1	1	1.00	consistent

2. The Focus Group Discussion Form

clause	Questions	Experts					IOC	Conclusion
		1	2	3	4	5		
1	In view of the current situation of sustainable development in physical education teaching in private colleges in Shaanxi Province, what strategies should policy and governance adopt to enhance the sustainable development of physical education teaching?	1	1	1	1	1	1.00	consistent
2	In view of the current situation of sustainable development in physical education teaching in private colleges in Shaanxi Province, what strategies should curriculum design and innovation adopt to enhance the sustainable development of physical education teaching?	1	1	1	1	1	1.00	consistent
3	In view of the current situation of sustainable development in physical education teaching in private colleges in Shaanxi Province, what strategies should faculty development and professional training adopt to enhance the sustainable development of physical education teaching?	1	1	1	1	1	1.00	consistent
4	In view of the current situation of sustainable development in physical education teaching in private colleges in Shaanxi Province, what strategies should	1	1	1	1	1	1.00	consistent

clause	Questions	Experts					IOC	Conclusion
		1	2	3	4	5		
	student engagement and lifelong learning adopt to enhance the sustainable development of physical education teaching?							
5	In view of the current situation of sustainable development in physical education teaching in private colleges in Shaanxi Province, what strategies should Financial sustainability and resource allocation adopt to enhance the sustainable development of physical education teaching?	1	1	1	1	1	1.00	consistent
6	In view of the current situation of sustainable development in physical education teaching in private colleges in Shaanxi Province, what strategies should infrastructure and technology integration adopt to enhance the sustainable development of physical education teaching?	1	1	1	1	1	1.00	consistent
7	In view of the current situation of sustainable development in physical education teaching in private colleges in Shaanxi Province, what strategies should community collaboration andindustry partnerships adopt to enhance the sustainable development of physical education teaching?	1	1	1	1	1	1.00	consistent

Reliability analysis of research instruments

Reliability

Case handling summary			
		N	%
case	effective	200	100
	Excluded[a]	0	0
	Total	200	100
a. List deletion based on all variables in this program.			

Results of variable reliability correlation analysis

Scale: all variables

Reliability statistics		
Cronbach's Alpha	Based on standardized items Cronbachs Alpha	Number of terms
0.88	0.88	35

Appendix E

Certificate of English

BANSOMDEJCHAOPRAYA
RAJABHAT UNIVERSITY

This is to certify that

Mrs.Liang Fangmei

Achieved BSRU English Proficiency Test (BSRU-TEP) level

C2

Given on 15th August 2025

(Assistant Professor Dr Kulsirin Aphiratvoradej)

Director

Appendix F

The Document for Acceptance Research

The Editorial Board of Higher Education Studies

Canadian Center of Science and Education

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August 4, 2025

Dear: Fangmei Liang

Thanks for your submission to *Higher Education Studies*.

We have the pleasure to inform you that your manuscript has been accepted for publication. It will be published in the issue of Vol. 17, No. 4, in October 2025.

Title: Development of Sustainable Strategy of Physical Education Teaching in Private Colleges in Shaanxi Province

Authors: Fangmei Liang, Touchakorn Suwancharas, Luxana Keyuraphan, Areeya juichamlong

If you have any questions, please do not hesitate to contact with us.

Sincerely,

Sherry Lin

CANADIAN CENTER OF SCIENCE AND EDUCATION

On behalf of,
The Editorial Board of *Higher Education Studies*
Canadian Center of Science and Education

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