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Integration and learning: a case study of the international higher physical education talent-cultivation model

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Introduction: This study delves into the multifaceted components of talent-training models within China's physical education domain through Sino-foreign cooperative initiatives. Employing a mixed-methods approach, it systematically evaluates the innovative systems developed by pilot units and outlines their experiential insights.

Methods: Using a mixed-methods approach, this research extensively evaluates the situation of pilot units by collecting and analyzing data from closed-ended and open-ended questionnaires as well as interview responses. The study categorizes and analyzes the data to comprehensively understand cooperative talent-training models.

Results: The findings are classified into three main themes: Learning, Integration, and Binary Evaluation and Practice Reform. Under the Learning theme, the study observed a selective integration of foreign educational paradigms into the local context, respecting the distinctiveness of Chinese education and aligning with national policies promoting unique educational systems. Additionally, the Integration theme underscores the necessity of meticulously assimilating introduced educational resources into China's educational fabric, highlighting the need for adaptability when integrating foreign educational elements. Furthermore, the Binary Evaluation and Practice Reform theme reveal the establishment of a dualistic evaluation and reform system tailored to cooperative education specifics, outlining challenges associated with ideological and cultural disparities when integrating certain foreign education aspects into the Chinese context.

Discussion: This research provides insightful exploration into the complexities of collaborative talent-training models in Physical Education. It not only elucidates the assimilation of foreign paradigms but also highlights nuanced challenges and prospects for developing tailored educational systems within specific regional and national contexts.

KEYWORDS

talent cultivation, cooperative education, higher physical education, CARE concept, pilot unit

Introduction

The internationalisation of higher education is considered a key indicator of economic globalisation. Further, the development of economic globalisation and the deepening of the international division of labour have emerged as crucial sources of the global allocation of higher education resources (Tight, 2021). China's rapid industrialisation increased the stringent demands for quality personnel in certain industries, and the country's status as a developing country created an especially urgent demand for highly qualified personnel in sports education and related fields. Thus, significant investment in developing the sports industry and personnel training was necessary.

Since the 1970s, when mainland China proposed the introduction of quality teaching resources through overseas cooperation, joint education, and distance learning, over 3,500 cooperative education projects with foreign countries have been approved (Mok and Xu, 2008; Ministry of Education, PRC, 2022). Therefore, transnational cooperative education has gradually become a crucial pillar of China's nationalised development of higher education, demonstrating considerable resilience during the Coronavirus disease 2019 (COVID-19) pandemic and the international turmoil of regional war (Sun et al., 2022). With the Chinese government proposing crucial national strategic plans, such as 'fitness for all' and a 'powerful sports nation', some local Chinese universities and traditional sports powerhouses have been cooperating immensely in the training of talents via physical education (PE), and joint programmes have emerged accordingly in PE. However, only a few studies have considered the development of international sports talent through cross-border education. Moreover, fewer studies have focused on developing specialised programmes involving China, a developing country with a high demand for sports talent, and traditional sports powerhouses, such as the UK and the US.

Thus, this paper presents a case study of a specialised sports talent-development partnership between a university that focuses on cultivating and training future teachers in China and an employment-focused university in the UK. [The university names have been redacted for peer review.] The project represents the world's first off-site sports talent-training model and the first full-scale introduction of a pilot higher PE programme in China. This project has achieved numerous results over the years, making its case study highly typical and innovative. In line with this pioneering initiative, our research aims to achieve several key objectives: (i) to analyse the efficacy and outcomes of the off-site sports talent-training model in developing high-level international sports personnel; (ii) to evaluate the factors that contribute to success and the challenges encountered in the collaborative efforts between Chinese and UK universities; (iii) to propose strategies for further enhancing the internationalisation of sports talent development within higher education; (iv) to provide insights into the cultural and educational exchange between countries with different backgrounds in sports education; and (v) to innovate, integrate, develop, and present a transnational collaboration-based model for talent development and identification in higher PE. These objectives guide our exploration and analysis, providing a comprehensive understanding of the implications and potential advancements in the field of international sports talent-training and cooperative higher education.

The results of our case study will further elucidate the strategy for constructing the high-level international sports personnel training model. Additionally, it will offer developmental ideas for the PE discipline under the cooperative system in today's global context and offer construction experiences for the transnational operation of higher

PE while presenting rational strategies for integrating and utilising PE resources between countries with different cultural backgrounds.

Theoretical framework

With the increase in educational resources and the spread of high-quality school sports activities, many researchers are now inclined toward domain-specific and multidimensional concepts of competence. They emphasise the development of behavioural potential and its interaction with personal and environmental characteristics. As a result, there are a growing number of developmental models of sports talent development that are widely employed in many countries and schools (Bailey and Morley, 2006; Prieto-Ayuso et al., 2022).

The CARE philosophy, developed by Grecic (2021), is a complete education system for talent cultivation. It utilises physical activities and challenges to develop every area of personal learning. It focuses on providing the support necessary for all people, whether children or adults, to become versatile, outstanding individuals with transferable life skills that can be applied to any subsequent sports, education, or employment field. The CARE concept comprises a four-cornered model with four significant dimensions, focusing on the individual's physical, mental, social, and emotional aspects and developing them in sports. The concept is now widely applied to developing youth soccer talent in parts of England, with fruitful results; it has significantly facilitated the construction of improved sports training systems in the region. The connotations and contexts of CARE can be better understood through the following description by Grecic (2021, pp. 227–228):

Over the last 30 years, many ideas and concepts (i.e., the many conceptual ideas that influence teachers' professional development, including the common conceptual approaches to PE and the single-competency development of talents via the aforementioned PE guidelines) have resonated and guided my teaching and coaching. Among them, humanistic coaching, personalised learning, player autonomy, growth mindset, and holistic development (i.e., these elements are considered core to the current curriculum guided by the CARE philosophy) have all exerted significant impacts. However, reflecting after many years of my attempts to use, embed, facilitate, and plan for these, I realised that although I knew what they were and why they were important, I was missing a crucial part of the teaching and coaching jigsaw, i.e., how to build, develop, and support them (i.e., a systematic theory to encompass these beneficial elements and guide the practice of PE).

The CARE philosophy was born in the above context. The results of its application responded partly to the core concerns of many PE teachers/coaches regarding the practical competencies that must be the focus of PE-based talent development, what the core system of indicators for evaluating high-level PE-based talents should look like, and how these elements interact with each other (Grecic and Ryan, 2018; Grecic and Taylor, 2021).

The 'five-concentration' ladder theory, proposed by Lee and Tang (2015), has emerged as a new talent-cultivation system to meet the needs of the era during which teacher qualification examinations are standardised across China. The talent-cultivation strategies based on the actual situation of China's K-12 teacher-education reforms, with the international sports-teacher-education organisation, as well as

primary- and secondary-education institutions (home and abroad) under the premise of good coordination and communication, organised several rounds of national research and many meetings of experts (Ma, 2022). The results of these research endeavours and meetings have been applied to adjust their training centre of gravity and means, allowing them to form their unique key teaching system (Figure 1).

The system comprises five modules: ‘focus on teachers’ skills,’ ‘focus on academic and sports-specific abilities,’ ‘focus on personalised development,’ ‘focus on internship and practical ability,’ and ‘focus on individual physical and mental health.’ Thus, the training objectives were clarified by combining the competency grading standards of Chinese teachers’ analysis of professional positions, generating a four-year progressive talent-training model and an integrated training process of ‘learning–practice–research.’

Methodology

Participants and context

Interventional and non-interventional data-collection-and-research methods were employed, including third-person-based observational research, interviews, and questionnaires with selected staff, students, and

administrators. The authors obtained approval from their university and college research ethics committees, after which they conducted a three-year (2019–2022) follow-up study. During this period, the researchers recruited some students, faculty, and administrative staff as the participants to fill out questionnaires. The recruitment requirements are as follows. Students must: (i) be full-time undergraduate students enrolled in the pilot unit through the formal admissions examination process; (ii) understand the specifics of the research project and agree to participate in a long-term follow-up study; and (iii) have no expectation of taking a leave of absence, long-term leave of absence, or changing majors during the future test period. Teachers must: (i) be full-time teachers formally recruited by the pilot and cooperative school units; (ii) have long-term educational and teaching experience or formal training in the fields of cooperative and PE; and (iii) understand and be willing to abide by the ethical guidelines of the study and the principles of protecting the privacy of the participants. Administrators must: (i) have a long history of dealing with administrative affairs of the pilot unit related to cooperative schooling and have rich working experience in educational management or related fields; (ii) be interested in the study and the pilot unit project and be willing to participate in the discussion and share their experiences and views; and (iii) have a deep understanding of cooperative schooling training programmes, educational policies, and institutional operation mechanisms. In addition to the above,

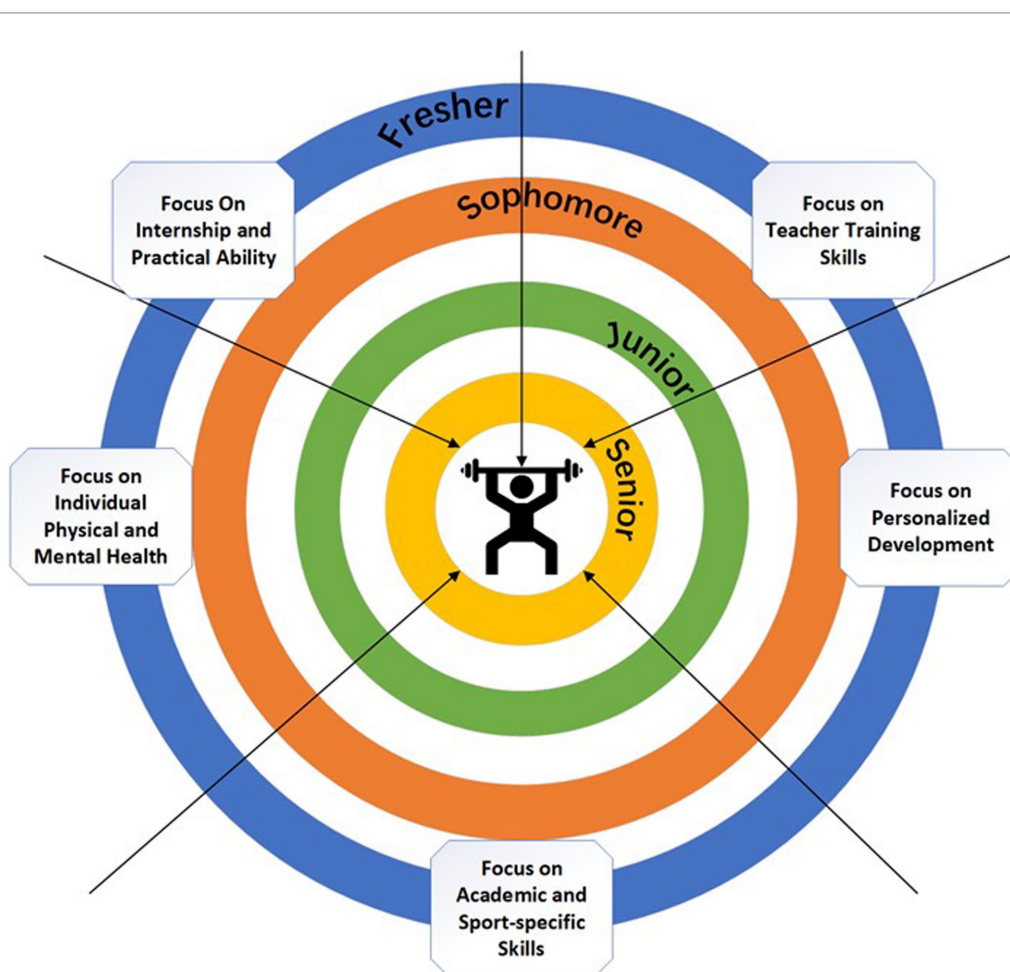


FIGURE 1 Key teaching points of the ‘five-concentration’ ladder talent-cultivation strategy.

representativeness and diversity were taken into account in the actual recruitment process. Individuals with different backgrounds, grades, and educational experiences were selected to obtain a diversity of experiences and perspectives as much as possible.

Further, the participants underwent face-to-face interviews during which they provided information and presented their informed consent documents for the study. In the subsequent deconstruction and evaluation of the talent-development model, we systematically referred to qualitative methods such as the analytic hierarchy process and the industry–university–research institution collaboration-based applied innovative talent-development model (Zhang, 2018; Yang, 2020). Figure 2 illustrates the research design and sub-domains, and Tables 1, 2 contain information from the questionnaires and interviews. By analysing participants’ perspectives on a deeper level, we can gain insight into the institutional development of cooperative education from various perspectives and understand potential operational problems. The primary data collected from the questionnaires and interviews were stored in a database, with personally identifiable information (such as names, addresses, and contact details) minimised. To protect the privacy of the participants, the data processing was uniformly conducted by trained personnel, ensuring anonymisation.

Data generation and collection

The data content and collection method were directly influenced by the Chinese disciplinary assessment system and conventional

formative evaluation model for PE (Kim, 2020; Tapia et al., 2021). We systematically observed the development of the PE discipline in the pilot unit of the study during the 3 years of cooperative education regarding the following: the construction of and investment in the discipline’s hardware (infrastructural construction and introduction of high-level teachers); the formation and development of the discipline’s soft strengths (construction of teaching models, construction of assessment systems, and development of the discipline’s culture); the subjective opinions and attitudes of the teachers and students. The study also presented an objective record of teachers’ and students’ subjective opinions and attitudes (class participation and attendance). A simultaneous survey was conducted on the development of the PE programme in traditional Chinese universities, and the survey was employed as the control group for comparison. During this period, the questionnaires and interviews with the recruited experts and teachers were employed as some of the indicators and questions (Figure 3).

The field observation data evaluated the quality of basic PE facilities, including the construction, use, and maintenance of course classrooms, meeting rooms, multimedia screening rooms, libraries, electronic databases involved in the curriculum, and athletic areas such as basketball courts and gyms. The research was conducted at 5-month intervals, with six visits before its end. The research data were deposited as videos, images, and phase-evaluation reports in the subject database.

Semi-structured interviews were conducted with groups of teachers, administrators, and students. The interviews were recorded

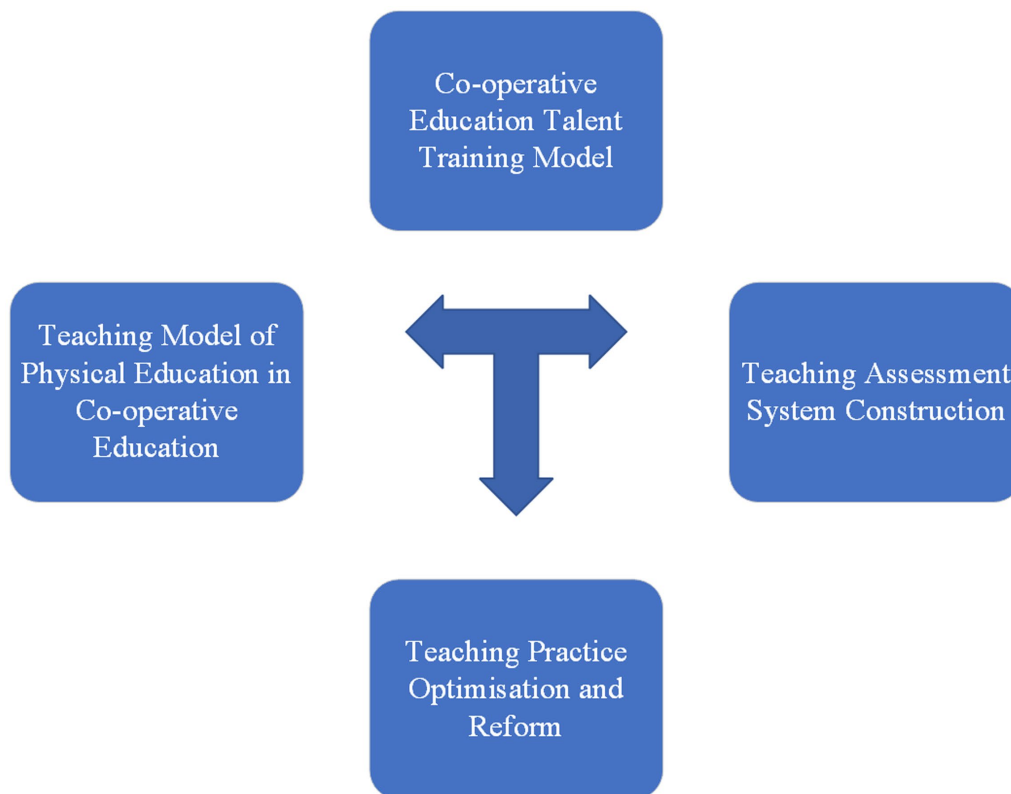


FIGURE 2
Schematic map of the research design.

TABLE 1 Questionnaire information.

Survey method	Subject population	Participants	Recycling situation
Questionnaire (No. 1)	Fresher, Sophomore, and Junior students	$n = 200$	186 (93%)
Questionnaire (No. 2)	Sophomore, Junior, and Senior students	$n = 200$	183 (91.5%)

TABLE 2 Interview information.

Survey method	Subject population	Participants	Average duration
Interview (No. 1)	Teachers	$n = 10$	47–55 min $M = 48$
Interview (No. 2)	Administrative staff	$n = 2$	33 & 37 min
Interview (No. 3)	Selected students	$n = 10$	23–31 min $M = 29$

on an audio recorder (iFLYTEK H1 Pro), and the paper transcripts were soft-translated using the accompanying software, after which they were manually proofread and signed by the interviewees. Next, the qualitative analysis of the relevant corpus was coded and supported by two qualitative analysis software packages, NVivo 12 and Maxqda.

The questionnaires were completed in paper and internet forms, with one-to-one guidance from the researcher. The survey included PE students undergoing a new talent-cultivation programme ($n = 200$) and regular Chinese PE students without a reformed teaching model ($n = 200$). The questionnaire design was inspired by the Sports Evaluation Service Questionnaire (EPOD2) and adapted to the experience of Fucini et al.'s (2008) questionnaire-based research (Ortín et al., 2008; Nuviala et al., 2013). The reliability and validity of the test were improved by pre-testing the questionnaire on different populations. The data results were then compared at a later stage. The paper-based questionnaires were manually entered into the system and double-checked by a validator, while the internet questionnaires were generated, after which the data were collected through WJX¹ (a platform that offers questionnaire distribution and collection functions) and exported to Microsoft Excel for initial screening and analysis.

Analytical strategies

Based on the questionnaire results and those exported from the academic system, the quantitative data were imported into the SPSS software (version 26.0) in Microsoft Excel for statistical analysis. The descriptive statistical method was employed to report the actual sample statistics and analyse the factors that influenced the training of PE personnel in the CARE context and the 'five concentrations' talent-training framework. Thus,

we conducted a cross-sectional comparison using several sports talent-training index systems to analyse our talent-training model's unique experiences and commonalities.

The relevant questionnaire content was analysed using Cronbach's coefficient measure to determine its reliability. Further, the content validity was analysed using the questionnaire pre-test. Finally, the structural validity was analysed via exploratory factor analysis, and the relevant statistics are presented in Table 3.

Results

Quantitative strand: staff and student survey results

Closed-ended results

The results indicated that constructing a basic teacher-education system is a prerequisite for constructing the PE-based talent-training model. This result produced the most frequent keyword in the interviews with the teachers and students; it was the most frequent option in the questionnaire's close-ended responses (Table 4). Table 5 presents the most common way participants described their possible paths to success during the interviews.

Open-ended results

The questionnaire featured an elicited question-and-answer session for the research participants. It used the What-How-Why logic matrix as a framework to induce the participants into articulating their talent-development priorities based on their experiences and self-understanding and conduct a brief analysis of the strengths, weaknesses, opportunities, and threats of their teaching environment and stage. The results revealed that 84% (310, $N = 369$) of the students attributed their achievements and future development to their ongoing training mode (Group α). Further, 11% (42, $N = 369$) of the students attributed the existing mode of human resource development to their current and future situations but were insufficient to determine it (Group β). Four students (1.08%) believed that the existing mode of their human resource development did not impact their future development and current situation. Furthermore, the open-ended answers of 13 respondents were not referenced because of their logic and off-topic or non-responsive natures. Thus, the open-ended answers of these 13 participants were not statistically valid after the manual screening.

The open-ended question-and-answer-clustering results of the alpha group exhibited a high correlation of key terms (Table 3), with synonyms set manually as equivalent indicators. The results revealed a high correlation between the lexical families of the following: 'educational models' (covering the etymologies of educational resource management models, teaching practice models, teaching reform models, teaching assessment models, and teaching assurance models) and 'educational resources' (covering the lexical families of education resource mobilisation, education funding, introduction of quality teaching and learning resources, and education security). There was a high-frequency recurrence of 'educational resources' (covering education resource financing, education funding, introducing high-quality teaching resources, and sharing high-level teachers). Based on the analysis of the semantic contexts, we concluded that a high correlation existed between the subjective perceptions of Group α and the educational resources and human resource development model.

1 www.wjx.cn

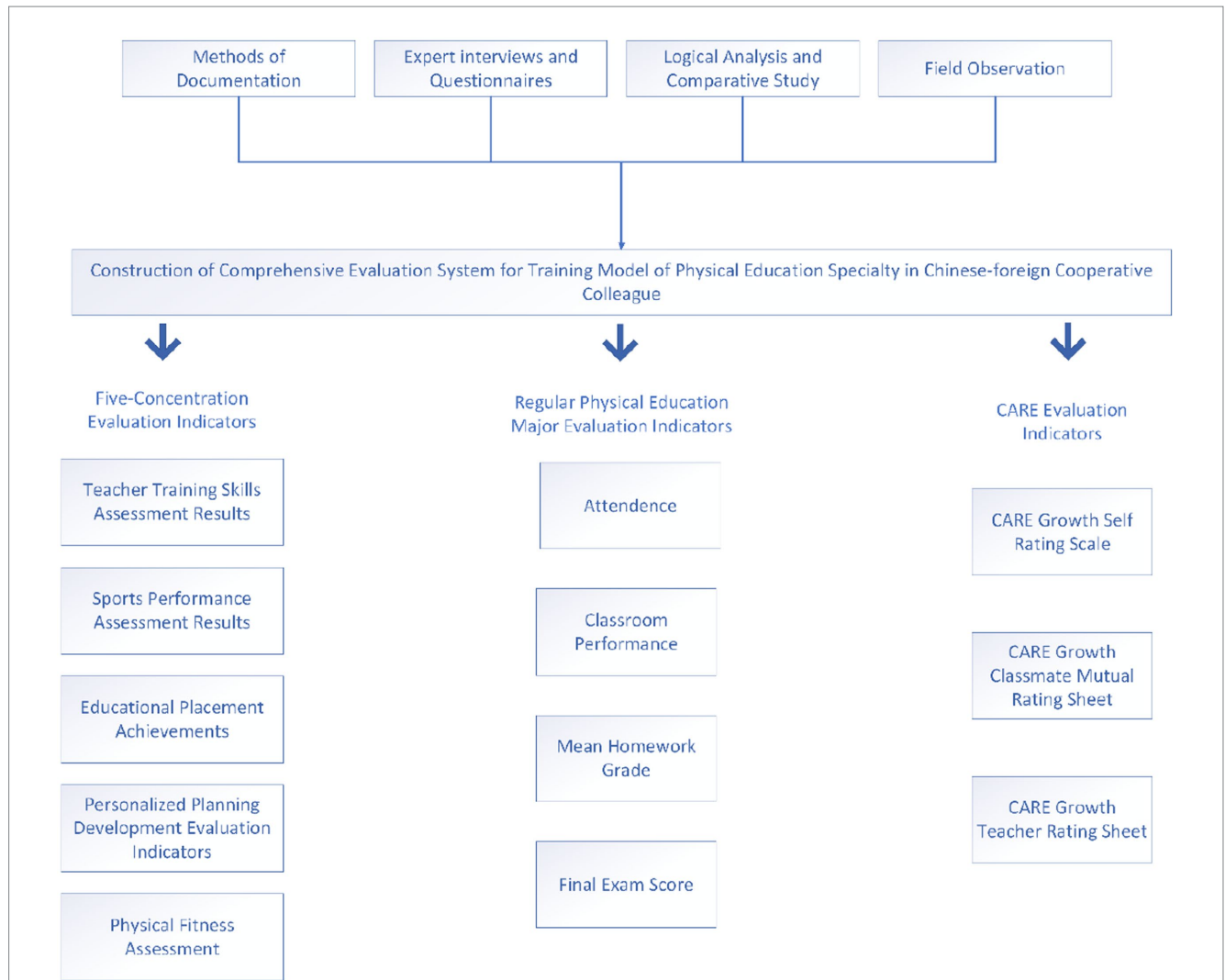


FIGURE 3 Schematic map of the key contents of the survey.

TABLE 3 Reliability, content validity, and construct validity analyses of the questionnaires.

Survey method	Reliability analysis	Content validity analyses	Construct validity analyses
Questionnaire (No. 1)	Cronbach's alpha = 0.847	Questionnaire pre-test and expert evaluation	Kaiser–Meyer–Olkin (KMO) test = 0.863; Bartlett's test = 1723.334
Questionnaire (No. 2)	Cronbach's alpha = 0.773	Questionnaire pre-test and expert evaluation	KMO = 0.731; Bartlett's test = 560.732

TABLE 4 High-frequency interview keyword statistics.

Staff		Student	
Keywords	Frequency	Keywords	Frequency
System/mode of teaching (management)	42	System/mode of teaching (management)	31
Quality-education resources	37	Campus culture and value orientation	25
Educational input	24	Students' ability and willingness to learn	23
Matriculate quality	21	Education and teaching resources	16
Teacher-education ability	19	University environment	12

TABLE 5 Statistics on perceived path to success as indicated in an interview.

Prompt	Answers (n-%)
Based on your self-perception and past experiences, which of the following do you think exerts a high impact on your personal path to success? Please select the relevant options and rank them in descending order of importance.	A: Self-initiative (94–25.4%)
	B: Educational resources the school can provide (76–20.5%)
	C: Teaching system and mode of individuals therein (117–31.7%)
	D: Teaching environment and campus culture (62–16.8%)
	E: Talent and ability to learn (83–22.4%)
	F: Teachers' teaching ability and other classroom factors (101–27.3%)

However, the keywords in Groups β and α overlapped, and most respondents acknowledged the teaching system's objective influence and external quality resources in the talent-development model.

Qualitative strand: interview findings and key questions of interest

The interview results were drawn from a selection of volunteer students, frontline staff, and administrators in the cooperative units (Table 1). Based on these results, we identified two main themes to describe the practical experience of building an international higher education talent-development model from different perspectives.

Theme 1: 'The core of the higher PE personnel-training model lies in the organic combination of a standardised education and teaching system with clear teaching objectives': Consensus on cooperative PE talent development.

The research participants extensively discussed the core issues regarding the construction of the sports talent-training model and existing construction experience. They formed a consensus from which some teachers derived subthemes based on their practical experiences.

Subtheme 1: The unique objectives of the school and specific philosophy of talent training determine the teaching curriculum, and the subsequent supply of talent is not limited to a single dimension.

The CARE concept of the 'five concentrations' approach to teaching and learning emphasises developing students' professional skills in their various social roles rather than in their future roles as teachers only.

We do not only wish to train them (the students) into becoming teachers, as PE is not limited to teaching sports. We want them to be able to benefit from the sports skills, teaching techniques, and tactical strategies we teach them in their future careers, regardless of their position—teachers, coaches, or researchers. Even if they end up in a non-sports-related career, they can take guidance from these simple philosophies.

The curriculum forms an essential part of the teaching model and accounts for the focus of a lecturer's attention (Borg, 2003). Some teachers further described their curriculum, which covers part of the

general education in sports and applied skills for high-frequency careers, as being comparable in proportion to the professional courses for teachers, considering the curriculum a crucial tool for assisting the diversification of talent. According to these teachers, PE teachers' business skills are highly common to those of other sporting professions, resulting in high talent transferability. Adapting the curriculum will enable the complete transformation of talents in a future niche career field. Closely related to this experience is the fact that the curriculum standards for primary and secondary schools in China and the UK require a review of skills for teachers and prospective teachers (students training to become teachers), particularly regarding the traditional curriculum delivery and transfer of new knowledge and skills and that such a curriculum system is logically linked to this framework (Department for Education, 2013; Ministry of Education of the People's Republic of China, 2022).

From an outside perspective, not all of our curriculum designs and content planning were conducive to our students' future employment or further study. In fact, we have arranged many community- and group-based courses with the anticipation of helping students build harmonious interpersonal and social skills through group activities. Vocational skills trainings are not the only focus; rather, communication skills, information-gathering skills, critical review methods, and other elements that will benefit them for life are also anticipated.

The CARE philosophy and 'five concentrations' model, which articulates the core elements of talent development in four dimensions and five approaches, respectively, have been widely recognised by teachers and students alike and have even materialised into a separate dualistic culture. This dualistic system was repeatedly mentioned by some of the students in their discussions on the teaching model and was considered an essential aspect of their self-development during their undergraduate years, with a particular focus on their social interactions with their peers.

From my perspective, the teaching system I underwent was with me at every stage of my learning, although I could hardly generalise it. It was like a cultural identity where we identified with some of the ideas in the model and applied them to our daily lives and actions. For example, we were asked to participate actively in the classroom and perform creative works. However, with additional training, this became less confined to learning and more integrated with other aspects of life, such as socialising and recreation. Now, even if I am asked to play a video computer game, I want to be always active and creative.

The consensus was passed from top to bottom and accepted by many groups under the system. However, not all opinions were positive, as some administrators offered alternative views.

The talent-development philosophy could be internally agreed upon and practiced through curriculum and teaching methods. However, a multidimensional philosophy and ideology offer a diverse platform for development, although it might also dilute the possibilities for specialisation. Some students have confirmed their career aspirations and areas they wish to explore in depth, although focusing on what they wish to learn in depth through this teaching mode is challenging. The interests of small groups must be examined; therefore, I think a more mature teaching system must exhibit self-correcting mechanisms and a relatively fair evaluation system.

Subtheme 2: Professional development and individual growth are essential threads in the CARE philosophy-based teaching assessment model.

The construction of a teaching-quality-evaluation system has always been of considerable interest, both as an integral part of the teaching model and as a crucial reference for evaluating the value of talent development. Interviewee 4 was interviewed as a participant while constructing the relevant evaluation system. He suggested that ‘teaching objectives are the starting point for constructing a teaching-quality-evaluation system and that teaching objectives reveal the kind of person we want to help the students become; conversely, the quality-evaluation system answers the characteristics such a person possesses and offers some quantifiable indicators.’ In the interviews with teachers who had been on the frontline of teaching and student-recruitment guidance for long, they mentioned that ‘many students stated in their entrance surveys that they wished to gain skills for the employment world through their university studies.’ In fact, this is what my colleagues and I aim to achieve via our teaching. One of the interviewed university lecturers who was also a student-career adviser mentioned that the ‘students who leave school with a degree always struggled to talk to me about their undergraduate experiences, particularly the non-academic parts, and that they generally felt that the most rewarding aspect of their undergraduate experiences was not what they learned but what they practiced outside the classroom.’ Based on the results obtained from interviewing the students, the impressions of teaching and learning assessment mainly seemed to revolve around what is on the transcript. However, many students also mentioned something beyond.

The report cards and class schedules record what I have learned in these classes, but I think this is one-sided; there are many intangibles, such as how to get along with friends, teachers, and superiors, how to organise activities and projects, and how to manage emotions. I think this is what is most valuable for my growth.

Responding to the results, some of the teachers who were interviewed about the assessment system and the original purpose of the assessment indicators concluded the following: ‘the established goal of training human resources motivates us to promote the development of students’ personal abilities, although in concrete implementation, it is more about developing their professional skills and needs as sports professionals. This is not the result we anticipated as we aimed to train complete people and prospective teachers who can adapt to the needs of teaching PE. This idea was derived from the CARE philosophy, which focuses on business and the growth of talents.’ Such a thought was noted many times during the interviews and observations; at this stage, it was carried through the regular student assessment and evaluation system.

Subtheme 3: The development of internationalised PE personnel training programmes should incorporate the characteristics of PE disciplines while highlighting the cultivation of teacher-training skills.

The talent-training programme is a normative document for implementing talent training to organise and arrange teaching activities and tasks; it is also the basis for implementing talent training and conducting quality evaluations. In the interview, some participants relayed their direct impressions of the talent-cultivation programme for PE under the cooperative school system in which words such as

‘balance’ and ‘equilibrium’ were frequently mentioned. The contexts of the questions and answers were based on ‘What do you think is the most important feature of the programme in this talent-development model?’ Participant 1 addressed this question systematically:

The important feature of the design of the talent-training programme under the cooperative schooling model is its balance, which is rooted in the special nature of the PE discipline and the essential requirements of teacher training.

The related views were not limited to this because unlike other disciplines, PE may require teachers to possess high physical and verbal skills, which must be developed from entry, not just by focusing on the individual elements of these skills.

The ‘balance’ is not limited to a single discipline; rather, it is the actual expectation of the CARE philosophy and ‘five concentrations’ talent-training strategy. We are concerned that in the current international division of labour, many majors overemphasise specialisation and refinement in talent training while ignoring the stages of talent development and migration. This is essentially a wrong estimation of the market demand and supply capacities for talent, which is unbalanced. The requirement of ‘balance’ is implemented in the curriculum arrangement and theoretical–practical learning arrangement, as well as other levels, to help students grasp more future opportunities.

Based on this ‘balanced’ viewpoint, the unique concept of ‘multi-specialty’ has been developed in the programme’s construction; many students mentioned it as an essential principle for their development. This concept was created because PE is a vast field of study where individuals struggle to find their sub-disciplines. Thus, a unique path toward PE-based talent training was formed by combining previous talent-training experiences and performing big-data surveys. In other words, students will opt for unique PE programmes, such as basketball and soccer, based on their interests and volunteerism. Therefore, they will also participate in other PE programmes that allow them to gain experience in other specialties.

Theme 2: ‘The introduction of quality teaching resources and localised adaptive reforms is a crucial path toward realising talent cultivation’: Important strategies for developing international PE personnel.

The introduction of quality educational resources is the core purpose of Sino-foreign cooperative education. Cultivating talent in PE depends on many resources and has numerous implications. The answers were systematically summarised into two subthemes.

Subtheme 1: Barriers to the introduction of quality resources in PE.

The introduction of quality PE resources at this stage was mainly aimed at introducing the curricula, teachers, teaching-management systems and modes, teaching kits, and teaching materials; it is divided into two forms—partial and full introductions. Regarding introducing and integrating quality resources, some teachers believed that introducing resources at this stage was accompanied by practical issues, such as incompatibility with local support facilities and inefficient use after introduction, which required urgent solutions.

The modules I delivered highly depended on the educational resources introduced by external parties, particularly the theoretical textbooks and teaching-guide cases for the courses. However, in actual teaching practice, I am not used to employing these enablers because of their complexity for many students; these students do not understand the underlying logic of these things (the actually delivered content in the textbooks and lesson plans), and I think it might be due to their different cultural backgrounds. Therefore, I am often required to replace some of the course materials with local content before teaching to ensure proper progression.

Introducing quality teaching resources involves transporting quality experiences and resources from foreign schools to new pilot units and requires adaptive changes and local integration. Further, other widespread compatibility and ancillary issues exist with the introduction of educational resources. They exert inherent disadvantages during introducing, developing, and migrating PE resources. Some teachers have implemented spontaneous and responsive measures, such as exploring local alternatives to the foreign conditions provided by their partners, to continue with regular lectures and ensure their students' understanding of internationalisation. Although some positive feedback has been reported on these actions, the actual results are often challenging to measure. In addition to these endogenous issues, there are many external challenges to introducing quality-education resources. For example, Participant 5 noted the following:

A crucial basis for the realisation of international talent development and cooperative education lies in the globalisation of the economy and education. However, issues, such as the outbreak of the COVID-19 pandemic and the Russian–Ukrainian conflict, have objectively inhibited the flow of educational resources on a global scale. This has prevented the introduction of external teachers, as well as the importation of some teaching facilities, significantly impacting the development of our daily teaching activities.

The endogenous issues and external threats constitute the main obstacle to constructing the current cooperative education. Compared with the traditional talent-training model, international talent training relies on more channels and support to supply educational resources, requiring establishing a sound educational supply system and diverse alternative solutions.

Subtheme 2: Localised development of external quality-education resources and adaptive reform responses.

In addition to the issues mentioned above regarding the quantity and quality of the introduced educational resources, other practical issues, such as the excessive economic attributes of the projects, as well as the lack of operational supervision in the construction of China's cooperative education projects and international talent-training models, exist (Thanon et al., 2021; Zhang, 2021). These issues are widely concentrated in the supply-side structure of educational resources and become prominent as talent-training programmes evolve. The interviewees proffered solutions to these questions based on their talent-development experiences. Administrative Staff 1 proffered the following:

We have been concerned with the feedback from the students, teachers, etc., since the launch of the cooperative programme, and we realised the inherent problems in advance, particularly during

the introduction, integration, and supply of educational resources. We continued to explore and strengthen the top-level design and innovative institutional mechanisms. As can be seen, we now have a unique system different from the 'egalitarian' and 'free distribution' mentality emphasised by some schools.

Several interviewees mentioned top-level design optimisations, emphasising that their more profound connotation lies in resource deployment and adaptive optimisation, content adjustment, quantity, and allocation strategy for introducing the resources according to the actual construction situation and characteristics of the development stage. The integration results comprised three crucial ideas. First, to plan all the aspects and links of the talent-training participation chain in an integrated manner, the project stakeholders, particularly the horizontal cooperative schools and vertical departments in the school, must be planned in an integrated manner. The purpose is to strengthen the primary school's sense of responsibility, emphasise the multifaceted integration and effectiveness of educational resources, provide reasonable and effective educational products for the educated, and supply specialised talent for the talent market to meet sports needs.

Second, professional construction must strengthen the operation and supervision of the cooperation system and control resources and ensure an adequate supply of the entire education process, which requires the gradual improvement of the mechanism and strengthening of the control. Cooperative education involves many business departments, such as the enrolment, teaching, and personnel of institutions; it requires the constant improvement of the internal governance structure and operation mechanism of institutions to optimise the talent-training services. Third, the integration of innovative research must be strengthened. The complete evaluation of the differences between Chinese and foreign talent-cultivation modes and concepts is a prerequisite for implementing scientific and reasonable structural reforms on the supply side of education and realising the complementarity and docking of educational resources between the two sides of cooperative education. This requires the accurate positioning and careful design of teaching programmes, contents, and methods from the supply side of educational resources, as well as the design of an innovative curriculum that integrates the advantages of international education with the characteristics of local education and teaching practices. Concurrently, international quality certification and guarantee systems must be implemented according to educational science norms to achieve the seamless integration and innovation of Chinese and foreign curricula.

The staff and students proposed, 'we should broaden the channels for raising educational resources and provide diversified educational services rather than limiting ourselves to a single source of teaching resources for cooperative education.' Therefore, providing a diversified supply of PE resources is key to improving the quality, efficiency, and innovation of the supply side of education.

The concept of reforming the localisation path of talent training originated from the practice of cooperative education under China's special national conditions. The practical experiences over the years have demonstrated that cooperative education must efficiently apply supply-side reforms to the reform of the talent-training system to ensure success, as this will generate a new supply-side structure. The fundamental reform from the 'demand-side pull' to the 'supply-side push' can only be achieved in this manner (Sun et al., 2022; Zuo et al., 2022). Some teachers pointed out the following:

The root of the development of cooperative education, as well as the improvement of talent-training models, must begin from the macro level—from the level of institutional mechanisms. The construction of innovative cooperative education reform systems and talent-training models is the path to sustainable development. In fact, for most regions, the resources accrued by cooperative education are instructive and cannot be used as received. They must be reformed in the light of local realities into a new path, one with vitality that suits the unit where it is located.

These views are also ideas adhered to and promoted by education administrations in some parts of China. According to local Chinese research (Lin and Liu, 2022), most local Chinese cooperative units are overly dependent on external resources for support and internationalisation pathways, and scholars believe that this is rooted in an underlying institutional deficiency. To address this issue, some faculty members believe that cooperative education units must attempt to implement bottom-level institutional reforms, particularly regarding the use of internationalisation resources.

At this stage, cooperative education highly depends on external support. This is not an individual challenge; rather, it represents the formation of a complete paradigm of cooperative education. Several emerging cooperative education sites follow such a system and such path dependence results in lowered risk resistance. Regional conflicts, international tensions, and the COVID-19 pandemic have accounted for significant international issues in recent years. Moreover, the unstable supply of external educational resources has often affected the regular operation of cooperative education. The path dependence on established international educational resources can hinder the innovation of institutional mechanisms. Additionally, reforming the systemic issues of a single supply of educational resources and localised integration is urgent.

Discussion

This study systematically reviews the main talent-training models in China's PE through Sino-foreign cooperation, systematically evaluates the innovative training systems built by the research participants and pilot units, and summarises their experiences. A mixed-methods grassroots study of the system and its experiences was also conducted for different groups. These results are of high practical significance for the positive migration of talent-development systems. Through this study, we aim to offer constructive ideas and theoretical support to developing countries and educationally deprived regions regarding the rational use of external resources to nurture local talent.

Review of experiences based on the research results

In addition to the four elements—the training objectives, training process, training system, and evaluation—the core of the talent-training model based on cooperative education lies in the introduction and utilisation of external educational resources (Xiao and Gao, 2018). Based on this, we summarised and classified the experiences of the pilot units in terms of professional development, considering the actual results of our research.

Talent-development model under the 'learning' theme

By integrating the results of the closed-ended and open-ended questionnaires, many results referred to the introduction of external educational resources and the localised construction of the international education system, which include the introduction of teachers, curricula, and other contents, as well as the imitation of the construction. At this stage, developed Western countries with world-class higher education and intensive sports resources are the main partners of Chinese-foreign cooperative education regarding the country (region) distribution (Zhang, 2021). In particular, foreign universities and partners have more mature experience in talent-cultivation and specialised curricula. Therefore, relying on China's local basic education facilities and 'learning' from the experience of foreign talent-development institutions, developing an independent talent-cultivation system offers an essential developmental idea for the pilot institutions.

This research reveals that the pilot units have not entirely departed from this pathway regarding talent development, with a complete set of educational models centred on the introduced British talent-development system, including a specific academic system (three-year degree system) and an honour-degree system. The specific talent-training details, including the curriculum design, training objectives (emphasising the building of students' critical-thinking skills, expression skills, and research skills), and the CARE-based philosophy of schooling, are mainly based on the British education system. However, regarding professional development, learning is not a complete transfer of the British education system to the pilot unit; rather, it is an act of 'abandonment' and selective learning. The co-organisers have integrated and used talent-training ideas as a reference, exhibiting a high transfer value and can be adapted to the Chinese educational environment while selectively abandoning some elements that do not exist in China, such as modules related to religious education and talent-training ideas that contradict mainstream Chinese values. In fact, such an approach agrees with China's educational policy and philosophy at this stage that the Chinese government is promoting the construction of 'double first-class' higher education (Zhang, 2022) to prioritise the development of some higher education units by adjusting the allocation of resources through administrative means. The specific outline of the 'double first-class' development plan (Feng, 2013) acknowledges support for some universities to cooperate with domestic universities by introducing foreign high-quality talent-training models (first-class academic disciplines and their first-class educational philosophy, educational management and teaching methods, and first-class teachers). Currently, China must encourage a similar school-running paradigm to establish a new path of talent training and realise the innovative development of cooperative talent training in specific disciplines.

Model for the use of educational resources under the 'integration' theme

China's unique education and political systems and the characteristics of the Sino-foreign cooperative education model determine that cooperative education is not a single construction of a foreign university branch in China. It is also not the introduction of

some external characteristic resources into China's local education system. The educational resources it introduces are also subject to strict supervision and evaluation and regular reviews (Jinhui, 2016). The 'integration' strategy is a significant summary of the localisation of external educational resources after their introduction. It is also a practical response to China's regional education policy. As the largest developing country and a multi-ethnic country with a long history, China has its educational and cultural uniqueness (Yang, 2021). Therefore, the market in the Chinese educational administration emphasises the development and construction of institutional mechanisms with Chinese characteristics in terms of what must be learned from the outside world and integrated development. This background is most directly reflected in the introduction of external educational resources, which are employed in addition to their adaptability to local education needs in China. The importance of 'integration' reflects the efficient development of many educational resources as soon as they enter China. The pilot study results reveal that introducing conventional educational resources, such as curricula and teachers, requires systematic integration and training before they can be formally introduced into the education system. This is especially evident in the case of intuitive educational examples and unconventional sports training skills, which are not readily accepted without localised cutting and adaptive development.

Model of talent assessment and reform of teaching practice based on the development of professional qualifications under the 'binary' theme

Regarding the evaluation and reform of talent development, the results of this study indicate that the pilot units had constructed a dualistic system of evaluating and reforming talent development based on the unique nature of their cooperative education. Regarding the evaluation systems, the CARE and 'five concentrations' concepts are widely used in teaching practice and evaluation to meet the needs of local and nationalised talent development in China. These two approaches have been developed and applied uniquely to meet the needs of the region where the partner is located; they have achieved good results in a visible period. Regarding the teaching practice reform model, a cyclical top-bottom self-reform model and feedback pathways have been developed based on the region's unique teacher training and sports-related professional qualifications.

However, implementing this approach can be challenging due to several difficulties. These challenges include globalisation, which encompasses traditional educational cultures and political factors in various locations. For example, in mainland China, ideological factors may result in the prohibition of religious, philosophical, and theological-related curricula and training elements. Additionally, the new education model and talent-cultivation system may have specific requirements for students' quality, readiness, and acceptance. Therefore, future research should focus on the following aspects. First, it is crucial to evaluate and analyse the effectiveness of the dualistic nature of talent-training model system in various fields and disciplines. Second, it is necessary to examine the actual impact and practical challenges posed by regional education policies on the dualistic system of talent training. Third, the issue of student group adaptation within the new system needs to be addressed, especially in terms of their ability to adapt across disciplines and the overall efficiency of

education and teaching. Finally, future studies should also emphasise the integration of technology and the implementation of innovative educational tools within the dual system.

Limitations

This study has some limitations. First, the sample, while typical of the subject and representative, is still relatively homogeneous. This may affect the assessment of the system's feasibility for replication on a global scale. However, different stages exist in the development of things and systems, and currently, there is no control sample available in the authors' region to verify the superiority of the system. Nonetheless, it is anticipated that an increasing number of higher education talent-training pilots will emerge in the near future.

Second, case studies heavily rely on multiple data sources, and our choice of mixed research methods as a means of data collection enhances efficiency but also reduces the opportunity to achieve consistent integration across different methods and validate data from multiple perspectives. Finally, the influence of the external environment proved to be a significant factor that we were unable to overcome due to time and resource constraints. Consequently, we were unable to conduct a broader global survey to gather evidence supporting our innovative system.

Despite these limitations, the study emphasises the need for further exploration, particularly through comparative analyses across disciplines and the adaptation of students to evolving educational systems.

Conclusion

This study conducted a meticulous examination of the multifaceted components of talent-training models within China's PE domain through Sino-foreign cooperative initiatives. Using a mixed-methods approach, it systematically evaluated the innovative systems developed by pilot units and outlined their experiential insights.

The findings highlight the crucial role of integrating external educational resources as the cornerstone of cooperative education models. The study focused on the 'learning' theme and observed a selective adaptation and integration of foreign educational paradigms into the local context. This strategy, grounded in international models, respects the distinctiveness of Chinese education and aligns with national policies that foster the development of unique educational systems within the framework of 'double first-class' initiatives.

Moreover, the 'integration' theme emphasises the necessity of meticulously assimilating introduced educational resources into China's educational fabric. This process exemplifies the need for adaptability and underscores the challenge of seamlessly incorporating foreign educational elements into the local landscape.

Additionally, the 'binary' theme reveals the establishment of a dualistic evaluation and reform system tailored to the specificities of cooperative education. Challenges, particularly related to ideological and cultural disparities, arise when integrating certain aspects of foreign education into the Chinese context.

In essence, this research offers valuable insights into the intricate dynamics of collaborative talent-training models in PE. It not only elucidates the assimilation of foreign paradigms but also highlights the nuanced challenges and prospects for developing educational systems tailored to specific regional and national contexts.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the corresponding author, without undue reservation.

Author contributions

JX: Data curation, Writing – review & editing. SL: Data curation, Writing – review & editing. YZ: Methodology, Writing – review & editing. QZ: Investigation, Writing – review & editing. HZ: Software, Writing – review & editing. CF: Software, Writing – review & editing. DG: Funding acquisition, Project administration, Resources, Supervision, Writing – review & editing. XP: Funding acquisition, Project administration, Resources, Supervision, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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