Education Insights

*Article*

# Construction of a Blended Teaching Model for Hurdle Running among Physical Education Majors in Chinese Universities under the Background of Smart Education

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**Abstract:** In the rapidly evolving context of smart education, traditional pedagogical approaches in higher education are undergoing significant transformations. This study examines the prevailing limitations currently observed in hurdle running courses designed for physical education majors within Chinese universities. These primary challenges include insufficient dynamic movement presentation, persistent difficulties in accommodating individual student differences, and a notable lack of comprehensive post-class feedback mechanisms. Based on an extensive literature review and rigorous conceptual analysis, this research integrates the unique technical characteristics of hurdle running with existing empirical evidence on blended learning methodologies in physical education. Consequently, an innovative blended teaching model is proposed to optimize instructional efficacy. The proposed model consists of four interconnected phases: pre-class cognitive preparation utilizing digital resources, in-class differentiated practice tailored to individual skill levels, post-class video-based consolidation for reflective learning, and a comprehensive whole-process evaluation framework. Furthermore, the model is elaborated in terms of its underlying pedagogical mechanisms and specific evaluation weightings to ensure objective assessment. The findings suggest that implementing this technologically integrated model can significantly enhance students' fundamental abilities in critical movement observation, facilitate immediate and accurate error correction, and promote sustained, independent practice. Ultimately, this research provides a robust theoretical foundation and practical guidance for the ongoing reform and modernization of hurdle running courses and broader physical education curricula.

**Keywords:** smart education; physical education; hurdle running; blended learning; process evaluation; pedagogical reform

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## 1. Introduction

Smart education has been driving significant changes in educational resources, learning processes, and evaluation approaches. China Education Modernization 2035 emphasizes the need to accelerate educational transformation in the information age and to promote intelligent, personalized, and lifelong learning [1]. This policy context indicates that university physical education courses should actively respond to digital transformation. However, it does not imply that hurdle running should be systematically included in general physical education courses for all university students. Hurdle running requires specific facilities such as hurdles and tracks, safety measures, and a certain level of technical foundation, making it more demanding and potentially riskier than general fitness activities. Therefore, this study does not broadly address "university hurdle courses in physical education," but instead focuses specifically on physical education majors in universities.

Within the training system of physical education programs in Chinese universities, track and field courses typically serve multiple functions, including the development of fundamental motor skills, the cultivation of specialized teaching abilities, and the

formation of training organization competence. Hurdle running is a representative technical event within this system. Physical education majors in this study refer to students enrolled in sport-related undergraduate programs, such as physical education, sports training, strength and conditioning, and social sports guidance and management, which are classified under the discipline of physical education in the undergraduate program catalogue issued by the Ministry of Education of China.

These students are expected to engage in careers such as physical education teaching, sports training, event organization, and health promotion [2]. Consequently, learning hurdle running is not limited to passing a technical assessment; it also involves understanding the structure of track and field techniques, mastering error correction strategies, and developing instructional and organizational capabilities. In this sense, the term "physical education majors" is more appropriate than "physical education students," as it better encompasses the range of relevant programs and avoids excluding disciplines such as sports training.

Currently, hurdle running instruction commonly follows a traditional sequence of teacher demonstration, student imitation, collective correction, and final assessment. While this approach is simple to organize and allows for strong classroom control, it has limitations in terms of movement presentation, individualized instruction, and post-class feedback. Due to the high speed and technical complexity of hurdle running, students often struggle to clearly perceive key elements such as take-off distance, lead leg action, trail leg recovery, and the first step after clearance through a single demonstration [3]. Once incorrect movement patterns are reinforced through repeated practice, subsequent correction becomes more time-consuming. In this study, smart education is not defined as merely transferring classroom activities online or mechanically using digital tools such as attendance systems and video playback. Instead, it refers to an educational approach supported by digital resources, intelligent platforms, learning data, and real-time feedback, enabling precise diagnosis, personalized guidance, and continuous evaluation of the learning process. In the context of hurdle running courses, smart education is manifested in the repeatable visualization of movement demonstrations, the identification of technical problems through video recording and comparison, the extension of teacher feedback from in-class to out-of-class settings, and the continuous tracking of learning processes through platform data. On this basis, blended learning supported by smart education can extend hurdle training beyond the classroom through video resources, platform-based tasks, motion review, and process tracking.

This study adopts the methods of literature review, conceptual analysis, and instructional design. The literature review is used to examine research on smart education, blended learning in physical education, and hurdle running. Conceptual analysis is applied to examine the limitations of traditional teaching and to establish the basis for model construction [4, 5]. Instructional design research is employed to integrate course objectives, learning activities, feedback mechanisms, and evaluation criteria into a feasible teaching framework. As no empirical classroom experiment is conducted, the data presented in this study are used solely as external evidence and design references rather than as experimental results.

## 2. Main Body

### *2.1. Specific Characteristics of Hurdle Running Courses*

The teaching difficulty of hurdle running first arises from the nature of the event itself. In the men's 110 m hurdles, athletes are required to clear 10 hurdles, with a hurdle height of 1.067 m, a distance of 13.72 m from the start line to the first hurdle, and an interval of 9.14 m between hurdles. The women's 100 m hurdles also include 10 hurdles, with a hurdle height of 0.838 m and an interval of 8.50 m between hurdles [2, 6]. In the 400 m hurdles, the distance from the start line to the first hurdle is 45 m, the interval between hurdles is 35 m, and the hurdle heights are 0.914 m for men and 0.762 m for women. These technical parameters indicate that hurdle running is not simply a matter of "jumping over

hurdles," but rather a continuous integration of speed, rhythm, spatial judgment, and body control.

Although physical education majors generally have a certain athletic foundation, they differ considerably in sprinting speed, flexibility, coordination, event-specific experience, and psychological confidence. A uniform arrangement of hurdle height, hurdle spacing, and practice volume may lead to two problems. Students with weaker foundations may develop fear of the hurdles and adopt conservative movement patterns, while students with stronger foundations may lack sufficient room for improvement and find the class insufficiently challenging [7, 8]. Therefore, hurdle running courses should not focus solely on the final demonstration of complete techniques. Instead, they should integrate low-hurdle practice, segmented drills, rhythm training, video feedback, and differentiated evaluation.

From the perspective of instructional objectives, hurdle learning for physical education majors should involve at least four levels. The first is observational competence, which means identifying take-off distance, body center of gravity, and inter-hurdle rhythm. The second is performance competence, which refers to completing segmented or full techniques appropriate to one's own skill level. The third is corrective competence, meaning that students can modify incorrect movements based on teacher feedback and video review. The fourth is instructional competence, which requires students to explain key technical points clearly and organize safe practice in future teaching or training contexts. The integration of smart education into hurdle running courses is intended to support all four of these levels simultaneously [9].

*2.2. Research Evidence and Teaching Implications*

To avoid relying solely on conceptual discussion without empirical support, this study draws on published research findings in the field of blended learning in physical education. A systematic review on the effects of blended learning in university physical education included 18 studies, with sample sizes ranging from 24 to 326 participants and a median sample size of 80. The review showed that 17 studies examined motor skills, among which 14 reported positive effects. Six studies examined learning attitudes and generally reported positive outcomes. Other indicators, such as learning interest, theoretical knowledge, and learning efficiency, also showed positive results [10].

Another systematic review on blended physical education included 22 articles, covering a variety of tools such as learning platforms, online resources, tests, questionnaires, and interviews [11]. The review noted that research on blended physical education has grown rapidly since 2018, with university students forming the primary research population, while also identifying five categories of challenges: instructional design, technological literacy, self-regulation, feelings of isolation, and acceptance of the approach. This indicates that blended teaching is not simply a matter of uploading videos to a platform, but requires teachers to redesign tasks, feedback, and assessment.

As shown in Table 1, compared with simply listing physical education programs or hurdle specifications, the external evidence provides more meaningful support for the present study. On the one hand, it summarizes research evidence on the advantages of blended learning over traditional instruction. On the other hand, it also indicates that hurdle running courses cannot directly copy the online-offline arrangement commonly used in theoretical courses. Hurdle running must retain a high proportion of face-to-face practical training, while elements such as movement cognition, error identification, video-based review, and process evaluation can be supported through smart learning platforms. In this way, the data evidence is more closely aligned with the central argument of this study.

**Table 1.** External Evidence and Teaching Implications for the Construction of a Blended Learning Model for Hurdle Running

| Source | Type of Evidence | Main Findings | Implications for Hurdle Running Courses |
|---|---|---|---|
| Blended learning review in university physical education | Included 18 studies on blended learning in university physical education, among which 17 involved motor skills and 14 reported positive effects | Blended learning generally showed positive effects on motor skills, learning attitudes, learning interest, and theoretical knowledge | Supports the design of pre-class video learning, in-class immediate feedback, and post-class review |
| Blended physical education review | Included 22 articles on blended learning in physical education, with undergraduates as the main research participants | Related studies have increased significantly since 2018, but challenges remain in instructional design, technological literacy, self-regulation, isolation, and belief acceptance | Hurdle running courses should emphasize task-chain design, appropriate use of technology, and students' self-regulation, while avoiding superficial platform use |
| Official hurdle event information from World Athletics | Provides clear official rules on the number of hurdles, hurdle height, distance from the start to the first hurdle, and inter-hurdle distance | Hurdle running requires rhythm control, spatial judgment, and continuous movement coordination | Teaching should emphasize differentiated practice, movement review, take-off point control, and inter-hurdle rhythm training |

Source: Compiled from relevant public literature and project materials [3-7].

As shown in Figure 1, blended learning produced a relatively high proportion of positive outcomes across dimensions such as motor skills, learning attitudes, learning interest, and theoretical knowledge. For hurdle running courses, these findings suggest that teachers can transform traditional problems, such as unclear movement observation, difficulty in tracking technical errors, and lack of post-class feedback, into teaching tasks that are recordable, comparable, and continuously improvable [12].

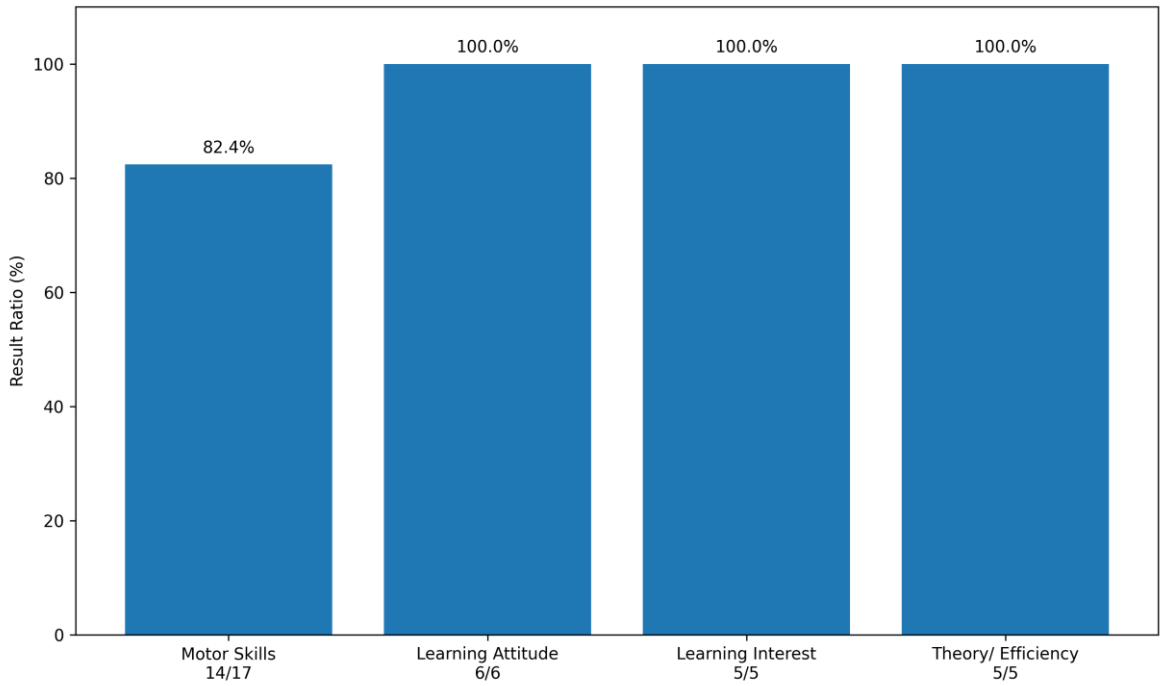


**Figure 1.** Proportion of Positive Findings in Research on Blended Learning in Physical Education

*2.3. Theoretical Foundations and Functional Mechanism*

Constructivist learning theory holds that learners actively construct meaning through context, interaction, and reflection. Hurdle running is a typical form of embodied and experiential learning. Students cannot perform the movement simply by understanding technical terminology; rather, they must gradually form movement representations through observation, imitation, trial and error, correction, and repeated practice [13]. Pre-class videos can help students develop initial cognitive understanding, in-class practice provides embodied experience, and post-class review supports reflection.

Outcome-Based Education (OBE) emphasizes the backward design of learning activities and evaluation methods based on expected learning outcomes. When applied to hurdle running courses, teachers should not merely set a vague goal such as "learning to hurdle." Instead, they need to specify the expected performance outcomes: students should be able to explain the technical structure of hurdle running, perform techniques appropriate to their own skill level, identify common technical errors and propose corrective strategies, and organize practice in accordance with safety principles.

Blended learning theory emphasizes the organic integration of online learning and face-to-face instruction. Research on information-based physical education in universities also indicates that the value of digital technology lies not in replacing physical practice, but in optimizing resource presentation, learning records, and feedback methods [14-16]. Based on this theoretical logic, the influence of technology-supported instruction on the quality of hurdle running instruction is mainly reflected in four aspects. First, videos, micro-lectures, and multi-angle movement resources can improve the visualization of technical movements. Second, classroom recording, immediate playback, and online feedback can enhance the timeliness of error correction. Third, learning records and differentiated tasks can improve the match between training content and students' individual foundations. Fourth, data records across the pre-class, in-class, and post-class stages can strengthen the continuity of evaluation. Therefore, blended learning supported by digital technologies does not simply add online components to the course. Rather, it improves the teaching quality of hurdle running through resource presentation, feedback diagnosis, differentiated training, and process evaluation.

As shown in Figure 2, the core model proposed in this study comprises both pre-class resource-guided learning and the cultivation of movement representation, in-class differentiated training and immediate error correction, and post-class video-based consolidation and individualized feedback. Whole-process evaluation feeds learning data back into the next round of instructional design. This structure helps avoid the formalistic problem in which online learning is reduced to mere check-ins while offline teaching remains unchanged [14, 15].

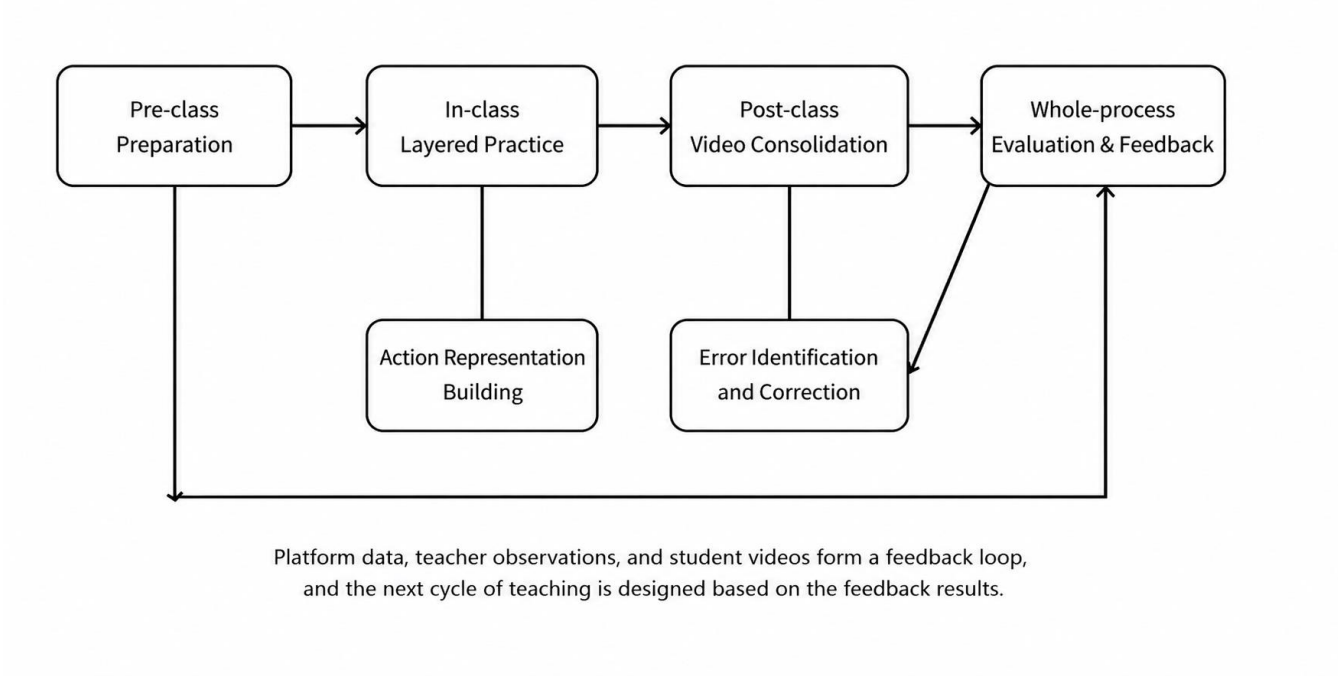


**Figure 2.** Structure of a Technology-Supported Blended Teaching Model for Hurdle Running

*2.4. Design of the Blended Learning Model*

First, pre-class cognitive preparation should be emphasized [10]. Teachers should divide hurdle running techniques into 3- to 5-minute micro-lectures, covering topics such as the approach from the start to the first hurdle, hurdle attack, lead leg downward action, trail leg recovery, and the first step after hurdle clearance. After watching standard demonstrations, slow-motion videos, and examples of incorrect movements, students complete an online quiz and upload videos of bodyweight imitation drills or low-hurdle auxiliary exercises. Based on these videos, teachers can identify common problems in advance, shifting classroom instruction from general technical explanation to problem-oriented correction.

Second, in-class differentiated practice should be implemented. The classroom process can follow the sequence of "problem introduction-demonstration comparison-differentiated practice-immediate playback-complete movement integration." Students with weaker foundations first complete low-hurdle, soft-hurdle, and short-distance segmented drills, with an emphasis on overcoming fear of hurdles, unstable take-off points, and loss of balance after hurdle clearance. Students with stronger foundations may further practice three-step inter-hurdle rhythm, continuous hurdle clearance, and complete running movements [7]. Teachers can use mobile phones or tablets to record key movements, replay them on site, and mark technical problems, allowing students to directly observe the differences between their own movements and standard techniques. As shown in Figure 3, visual recording of a practice scene can help students connect technical explanation with actual movement performance.

**Figure 3.** A Practice Scene of Hurdle Running Technique

Note: The person shown in Figure 3 is the author, who has consented to the publication of this image.

Third, post-class video-based consolidation should be strengthened. Post-class tasks should not be reduced to simple check-ins, but should be assigned according to individual problems. Students with unstable take-off points may practice marker-line running and low-hurdle attack drills; students with obvious deviations in lead leg direction may perform side-hurdle lead leg drills and resistance-band-assisted exercises; and students with disordered inter-hurdle rhythm may practice continuous clearance over reduced-spacing hurdles. Students upload short videos and training reflections on a weekly basis, while teachers provide feedback through text, audio, or short video responses, thereby forming a process of continuous improvement.

Fourth, whole-process evaluation should be established. The evaluation system should integrate pre-class preparation, in-class practice, post-class consolidation, and final performance. Platform data can record learning duration, the number of video submissions, and task completion rates. However, these data should not be directly equated with learning quality. Teachers still need to make comprehensive judgments based on on-site observation, movement quality, progress, and safety awareness [17].

As shown in Table 2, the evaluation design reflects a shift in the evaluation of hurdle running courses from an outcome-oriented approach to a process-oriented approach. For physical education majors, speed performance is important, but movement understanding, error correction ability, organizational competence, and safety awareness are equally essential. The advantage of blended learning lies precisely in its ability to preserve evidence of the learning process and transform such evidence into a basis for students' subsequent training [17].

**Table 2.** Evaluation Design for a Blended Teaching Approach to Hurdle Running

| Evaluation Stage | Evaluation Content | Suggested Weight | Design Purpose |
|---|---|---|---|
| Pre-class preparation | Micro-lecture learning, online quizzes, pre-class practice videos | 15% | To help students enter class with identified technical problems |

| | | | |
|---|---|---|---|
| In-class practice | Differentiated drills, movement quality, classroom participation | 35% | To emphasize the practical nature of hurdle running courses |
| Post-class consolidation | Video assignments, training reflections, improvement of individual problems | 20% | To extend the technical correction process beyond class |
| Learning process and safety performance | Peer evaluation, attendance, safety awareness, compliance with practice requirements | 10% | To strengthen cooperative learning and risk awareness |
| Summative evaluation | Complete technical performance, event-specific achievement, technical explanation and teaching expression | 20% | To integrate the abilities to perform, observe, correct, and teach |

*2.5. Implementation Conditions and Application Boundaries*

Resource development should be concise and targeted. Micro-lectures on hurdle running should not be produced as full-length classroom recordings. Instead, each video should focus on a specific technical issue, such as why the take-off point should not be too close to the hurdle, why the lead leg should actively drive downward, or why the first step after hurdle clearance should move forward actively. Each video should be limited to 3 to 5 minutes, allowing students to review it repeatedly before and after class. Cases of incorrect movements should also be classified and stored so that teachers can quickly match students' videos with similar technical problems and improve feedback efficiency.

Classroom equipment should follow the principle of sufficiency rather than excess. Hurdle running courses do not necessarily require expensive motion capture systems. Mobile phones, tripods, projection devices, and commonly used learning platforms are sufficient for movement recording, slow-motion review, and assignment submission. The key issue is not the cost of equipment, but the shooting angle, feedback criteria, and frequency of use. Teachers should fix the recording positions in advance. For example, side-view recording can be used to observe take-off distance and body center of gravity, while front-view recording can be used to observe lead leg direction and body balance. This helps avoid the problem of collecting many videos that cannot effectively support technical correction.

Safety management should run through the entire teaching process. Pre-class resources should include reminders about warm-up, hurdle height selection, protective assistance, and fall risks. In-class practice should follow a progression from low to high hurdle height, from slow to fast movement speed, and from segmented drills to complete techniques. Post-class tasks should mainly consist of bodyweight drills, low-hurdle exercises, and auxiliary practices. Students should not be required to complete difficult continuous hurdle drills without supervision [11]. Smart education can extend the learning process, but it cannot transfer the responsibility of risk management to students individually.

The teacher's role should shift from that of a single demonstrator to that of a designer, diagnostician, and feedback provider. Blended learning does not reduce teachers' work; rather, it changes the focus of their work [13, 17]. Teachers need to design learning tasks in advance, adjust practice levels according to students' classroom performance, and provide specific feedback based on post-class video materials. Only when online

resources, offline practice, and evaluation criteria are aligned can blended learning truly improve the quality of hurdle running courses.

## 3. Conclusion

This study constructs a blended learning model supported by smart education to address the teaching needs of hurdle running courses for physical education majors in universities. Based on the technical complexity of hurdle running, its high rhythm requirements, evident individual differences among students, and strong demand for continuous feedback, the model integrates pre-class cognitive preparation, in-class differentiated practice, post-class video-based consolidation, and whole-process evaluation into a complete instructional cycle.

The study suggests that the core issue in hurdle running courses is not whether students know the hurdle height or hurdle spacing, but whether they can form stable movement patterns during high-speed running, identify technical errors in time, and make continuous corrections. Digitally supported blended learning can address the limitations of traditional instruction, including the instantaneous nature of demonstrations, discontinuous error correction, and single-dimensional evaluation, through pre-class resource-guided learning, in-class video feedback, post-class individualized consolidation, and whole-process evaluation. Existing systematic reviews indicate that blended learning has positive effects on motor skills, learning attitudes, learning interest, and theoretical knowledge, thereby providing indirect support for the reform of hurdle running courses. Future research should further conduct pre- and post-tests with control groups in real classroom settings to verify the actual effects of this model on hurdle technique performance, learning interest, and self-correction ability.

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