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Development of Colleges Basketball Skills and Refereeing Curriculum to Enhance Student's Learning Outcome

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ABSTRACT

This research aims to determine the learning effectiveness of offering basketball skills and a referee curriculum for college students. Studying basketball rules helps students practice standardized technical movements and understand the characteristics of basketball technology. While also assisting in the improvement of referee ability. Through purposeful sampling, reference materials, interviews, data collection, experimental design, on-site teaching, and result analysis, the research subjects are students of the 2022 basketball curriculum at Xinxiang Medical University in China. A total of 60 students were selected from 2 classes. The results are: (1) Fundamental data and information were investigated to develop a curriculum aimed at improving students' basketball skills and refereeing abilities. (2) The basketball skills and refereeing curriculum was effectively promoted, enriching students' opportunities to acquire advanced knowledge and practical skills in basketball. This curriculum served as an innovative approach to enhancing the construction of college education and teaching systems. (3) The learning outcomes of students' basketball skills and refereeing abilities were systematically evaluated after the implementation of the curriculum, demonstrating its effectiveness in achieving the desired educational objectives. This research is significant in advancing physical literacy by developing a comprehensive basketball skills and referee curriculum that enhances students' technical competence, understanding of standardized movements, and referee skills. This will ultimately foster a lifelong engagement in physical activity and sportsmanship among college students.

Key words: Basketball Skills, Physical Literacy, Basketball Referees Ability, Curriculum

INTRODUCTION

Basketball, a trendy sport among college students, plays a pivotal role in physical education programs across universities, positively impacting students' physical and mental health while promoting their holistic development. However, traditional basketball curricula in many universities often limit student engagement by focusing narrowly on basic technical skills, such as passing, shooting, and dribbling, without capturing the more dynamic, team-oriented, and strategic elements that make the sport so engaging and challenging. This skill-centric approach can neglect essential components of physical literacy, such as understanding game strategy, fostering teamwork, developing communication skills, and building referee competencies. Together, these elements deepen students' appreciation of the sport and cultivate confidence, decision-making abilities, and a sense of responsibility. Students need to integrate these broader dimensions to experience the curriculum as monotonous or uninspiring, potentially limiting their enthusiasm and willingness to engage in basketball actively.

To fully nurture physical literacy, university basketball curricula must go beyond technical skill development to include a well-rounded understanding of basketball theory, team play's strategic and cooperative nature, and essential refereeing knowledge. The basketball skills and referee curriculum is designed to bridge this gap by offering a comprehensive approach that incorporates the rules, ethics, and responsibilities of refereeing alongside the technical and tactical elements of the game. By covering essential aspects such as on-court decision-making, game management, and professional conduct, the curriculum fosters a more profound sense of the sport's collective and knowledge-rich aspects, ensuring students gain a well-rounded skill set. Integrating theory with practical skill-building gives students the confidence, motivation, and competence to engage meaningfully in basketball, supporting their journey toward physical literacy.

The curriculum seeks to overcome limitations in traditional basketball teaching structures—such as limited class time, a lack of individualized instruction, and a predominantly passive learning model—by encouraging students to take an active role in their learning. Through engaging with both

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the technical and theoretical aspects of the sport, students not only enhance their basketball skills but also develop valuable life skills, such as teamwork, leadership, and strategic thinking (Fred, 2011). The holistic approach of the basketball skills and referee curriculum enriches students' understanding and application of the sport, promoting a sustainable interest and a lifelong commitment to physical activity.

Ultimately, this curriculum positions basketball as an influential contributor to university students' physical literacy, well-being, and personal growth. By fostering a learning environment that emphasizes both the personal and social dimensions of physical literacy, the curriculum prepares students for successful participation in basketball and ongoing engagement in sports and physical activities. This approach highlights the potential of university physical education programs to equip students with the skills, attitudes, and values that encourage a lifetime of active, healthy living, demonstrating basketball's vital role in supporting their holistic development.

RESEARCH OBJECTIVE

This study aims to establish foundational data to develop an enhanced curriculum that promotes physical literacy by improving students' basketball skills and referee competencies. Grounded in the Basketball Skills and Referee curriculum, the research employs a systematic approach to curriculum development, including a trial implementation to refine and optimize instructional strategies. Through this curriculum, students build technical proficiency and develop confidence, motivation, and decision-making skills essential to physical literacy. Following its application, the study evaluates the curriculum's effectiveness by assessing learning outcomes, focusing on students' basketball abilities and officiating skills, to support a well-rounded and comprehensive physical literacy development among Xinxiang Medical University students.

METHODOLOGY

This study adopts a structured, multi-phase methodology to enhance and refine the existing basketball elective curriculum for Chinese college students. It aims to correct curriculum deficiencies and elevate teaching quality and efficacy.

Literature Review and Expert Consultation

The initial phase focuses on gathering relevant literature and interviewing field experts to identify critical issues in the basketball elective curriculum. Using targeted keywords, a comprehensive literature search was conducted across domestic and international academic databases, covering publications that inform the curriculum's structure and improvement strategies. Expert interviews further addressed specific challenges in the curriculum, revealing key areas needing enhancement. Methods applied in this phase included a systematic literature review and expert consultations, establishing a foundational understanding of the Basketball Skills and Referee curriculum, the factors influencing its development, and the contextual needs of Chinese college students.

In addition, a structured questionnaire survey and initial discussions were carried out with students enrolled in basketball electives to understand common challenges in their learning experiences and pinpoint areas where skill gaps exist. Expert visits to leading academics in physical education facilitated critical discussions on the curriculum's reform, and expert recommendations guided a feasibility study on optimal course design, examining both reliability and practical applicability.

Curriculum Construction and Development

Building upon insights from the initial phase, focusing on curriculum construction, this phase explicitly targeted the refinement of teaching content, methods, and evaluation criteria. Based on feedback from expert interviews, improvements in teaching content, pedagogical approaches, and assessment standards were proposed. This phase included formulating a detailed teaching outline and developing evaluation standards for the Basketball Skills and Referee curriculum. Curriculum components, such as the syllabus, teaching plans, and assessment rubrics, underwent further expert review to validate their suitability and effectiveness.

Implementation and Data Collection

The final phase involved a six-month curriculum intervention, where the refined curriculum was implemented for two classes over one academic semester. Data was collected before and after the intervention to evaluate curriculum effectiveness. A baseline assessment of basketball skills was administered to 60 students from two classes, with data recorded for comparison purposes. Curriculum implementation proceeded according to the structured syllabus, employing a teaching experiment method with bi-weekly classes over 16 weeks. Following the semester, a post-test was conducted to assess changes in basketball skills, allowing a comparative analysis to determine the impact of the curriculum reform on students' abilities, ultimately validating the scientific rigor of the curriculum improvements.

RESULTS

The Basketball Skills and Referee curriculum integrates essential referee rules alongside basketball skill development, fostering students' physical literacy by enhancing their technical knowledge, confidence, and understanding of behavioral norms within the sport. This integrated approach allows students to clearly understand skill requirements and standards, reducing unnecessary errors and improving practice efficiency. Through curriculum engagement, students build their technical abilities and competencies as informed and effective referees, essential elements of physical literacy (Deng, 2013). The curriculum framework includes an introduction, course objectives, credit hours allocation, and specific teaching objectives and content for both skill development and practical application, equipping students with a comprehensive understanding and fostering lifelong engagement in physical activity through basketball.

Basketball Skills Test

Test content: Dribble layup

Test method

To assess students' proficiency in performing a full-court dribble layup, candidates begin by positioning themselves behind the end line. On the signal to start, they dribble down the court's full length and attempt as many successful layups as possible within a one-minute time frame (Sowell, 2005). The number of successful layups is recorded as the test result, indicating each candidate's dribbling control, speed, and layup accuracy under timed conditions.

The rules stipulate that each layup attempt must be successful (i.e., the ball must go through the basket) to count toward the final score. For each instance of a rule violation—such as a missed layup or other infractions—five points are deducted from the candidate's total score. This penalty system emphasizes precision and accuracy, requiring students to focus on speed and maintaining control throughout the dribble and layup execution. A minimum score of 60 is required to pass, indicating a basic level of competence in executing a full-court dribble layup under timed conditions. This test evaluates students' technical skills, coordination, and ability to perform under pressure, essential for compelling gameplay and contributing to their overall physical literacy in basketball.

Scoring criteria

Score	100	90	80	70	60	50	40
Boys	8	7	6	5	4	3	2
Girl	7	6	5	4	3	2	1

Basketball Referee Rules Test

The evaluation for referee certification in this study utilizes the "Level 3 Referee Exam Paper" and corresponding scoring standards established by the Chinese Basketball Association, ensuring a standardized and recognized benchmark for assessing refereeing competence. The examination includes comprehensive questions that test knowledge of basketball rules, officiating procedures, and situational judgment to ensure candidates thoroughly understand the requirements for officiating at a basic level. A minimum passing score of 60 is required to achieve certification, indicating that the candidate has met the Association's baseline competency standards. This standardized assessment framework validates the fundamental refereeing knowledge needed for Level 3 certification and aligns with national standards, thereby promoting consistency and quality across basketball officiating training programs (Luo, 2017).

Analysis of the results of basketball skills and referee ability

In this study stage, paired sample t-tests were conducted to assess whether there were significant differences in basketball skills and basketball referee theoretical knowledge among the research subjects before and after the instructional intervention. This statistical method was chosen for its ability to compare two related samples, providing insight into any measurable improvements in both practical skills and theoretical knowledge that students gained from the curriculum. Using SPSS software for data analysis, preliminary checks confirmed that both data sets followed a normal distribution, validating the use of paired sample t-tests.

The analysis examined students' proficiency in core basketball skills, such as dribbling, shooting, and passing, alongside their understanding of referee rules, procedures, and decision-making abilities. By comparing pretest and post-test scores, the paired sample t-tests enabled a detailed evaluation of the curriculum's impact on students' development in both areas. The following analysis presents the statistical results, highlighting any significant gains in physical and theoretical competencies related to basketball and officiating knowledge, reflecting the effectiveness of the curriculum in enhancing students' overall physical literacy and preparedness for active, skilled participation in the sport.

The data in Table 1 reveal the impact of the Basketball Skills and Referee curriculum on developing students' physical literacy, as seen through improvements in technical basketball skills and knowledge of game rules and officiating.

In the pretest, Class 1 and Class 2 showed similar baseline scores for basketball skills, violation penalties, foul penalties, and special case handling, with no significant differences. However, post-test results highlight notable improvements in these areas for both classes. Class 1 demonstrates a slightly higher increase in basketball skills, violation penalties, foul penalties, and unique case-handling scores than Class 2. For instance, the basketball skills scores improved from 70.74 ± 4.32 to 88.74 ± 3.63 in Class 1 and

Table 1. The difference between basketball skills

Index		Class 1(n=30)	Class 2(n=30)	F	*p*
Basketball skills	Pretest	70.74±4.32	71.65±4.48	13.426	<.001
	Post-test	88.74±3.63a	85.28±3.45ab		
Violation penalty	Pretest	12.52±3.43	11.76±4.38	8.024	0.011
	Post-test	27.18±7.28a	24.34±10.53ab		
Foul penalty	Pretest	11.76±1.34	11.85±1.76	6.650	0.031
	Post-test	18.65±3.30a	16.75±2.18ab		
Special case	Pretest	19.74±4.35	20.21±5.58	6.442	0.033
	Post-test	29.83±6.82a	25.72±8.70ab		

from 71.65 ± 4.48 to 85.28 ± 3.45 in Class 2, indicating a significant increase in proficiency (F = 13.426, p <.001). This growth in basketball skills aligns with physical literacy, reflecting enhanced competence, confidence, and motivation to engage with the sport.

Improvements in the violation and foul penalty scores also underscore the curriculum's role in enhancing students' understanding of game rules and behavioral expectations, critical components of physical literacy. Class 1's scores for violation penalties increased from 12.52 ± 3.43 to 27.18 ± 7.28, and foul penalties from 11.76 ± 1.34 to 18.65 ± 3.30, indicating an increased awareness and application of rules during gameplay (p =.011 and p =.031, respectively). These gains suggest that students became more attuned to fair play and regulatory aspects, reinforcing their confidence and ability to make informed decisions on the court.

Additionally, the scores for handling exceptional cases improved, from 19.74 ± 4.35 to 29.83 ± 6.82 in Class 1 and 20.21 ± 5.58 to 25.72 ± 8.70 in Class 2 (p =.033), demonstrating students' capacity to respond effectively to complex in-game situations. This increase in knowledge and adaptability contributes to physical literacy by enabling students to navigate diverse and dynamic aspects of gameplay with more excellent skill and understanding.

Overall, the curriculum's impact on physical literacy is evident across these indicators, as students not only gained technical basketball skills but also developed a comprehensive understanding of rules and effective game conduct. This approach fosters a holistic engagement with the sport, supporting students' ability to confidently, competently, and enthusiastically participate in basketball as a lifelong physical activity (Li et al., 2020).

Comparing the results of the two classes before and after teaching, it was found that the evaluation criteria and indicators of the research subjects after teaching were significantly higher than before teaching (p<.05).

The data in Table 2 provides insights into the development of physical literacy components, specifically related to referee techniques, among basketball skills and referee curriculum students. The comparison between Class 1 and Class 2 highlights changes in students' referee gestures and professional qualities, reflecting the curriculum's impact on their confidence, competence, and understanding of the officiating aspect of the game—core attributes of physical literacy (Cheng, 2017).

For referee gestures, both classes showed improvement from pretest to post-test, with Class 1 achieving a higher post-test average (36.62 ± 7.84) compared to Class 2 (33.45 ± 7.82). This significant increase (F = 8.726, p =.006) indicates that students developed a more transparent, more precise understanding of the physical actions required for effective officiating. Mastery of these gestures suggests improving students' ability to communicate and enforce rules confidently, contributing to their overall physical literacy by enhancing their practical skills and situational decision-making abilities within the sport.

For referee professional qualities, both groups also showed progress, with Class 1 increasing from a pretest average of 4.35 ± 1.76 to a post-test of 7.50 ± 2.17 and Class 2 from 4.38 ± 1.27 to 6.15 ± 2.52. The significant improvement (F = 7.953, p =.012) in professional qualities reflects students' growing understanding of a referee's ethical and behavioral expectations, supporting their social and personal responsibility development—critical aspects of physical literacy. These improvements show that the curriculum strengthened students' practical skills and nurtured the attitudes and values essential for compelling, fair gameplay, reinforcing their readiness to engage in basketball responsibly and confidently.

Overall, the increases across skill-based and professional attributes demonstrate that the basketball skills and referee curriculum effectively promote physical literacy by building students' technical competence, confidence, and ethical awareness. This structured growth in officiating skills supports students' broader engagement in sports and encourages a lifelong commitment to physical activity and informed participation in sport-related roles (Niu, 2019).

The impact of basketball refereeing knowledge on students' physical literacy development is evident in the survey results, where students consistently reported that learning refereeing rules and methods positively influenced their learning outcomes (Huayi, 2014). By acquiring referee knowledge, students gained a deeper understanding of the basketball game, enabling them to analyze game situations more effectively and make strategic, informed, tactical decisions. Additionally, acting as referees allowed students to exercise crucial aspects of physical literacy, including organizational skills, judgment, and a commitment to fairness—attributes beneficial to their future careers and personal growth.

Following the curriculum, 26 students voluntarily participated in the referee-level examination organized by the Xinxiang Basketball Association. All 26 students successfully passed the theoretical test, earning the third-level basketball referee qualification and certificate, which reflects the curriculum's success in fostering technical skills and the confidence and ethical understanding essential to physical literacy. These achievements underscore that the developed basketball skills and referee curriculum is highly effective in promoting comprehensive physical literacy by building students' basketball competencies, refereeing abilities, and a lifelong commitment to active, responsible participation in sports.

Table 2. The difference between referee techniques

Index		Class 1(n=30)	Class 2(n=30)	F	*p*
Referee gestures	Pretest	27.31±5.23	27.42±5.17	8.726	006
	Post-test	36.62±7.84a	33.45±7.82ab		
Referee professional qualities	Pretest	4.35±1.76	4.38±1.27	7.953	.012
	Post-test	7.50±2.17a	6.15±2.52ab		

DISCUSSION

The discussion highlights the significant impact of the Basketball Skills and Referee curriculum on fostering physical literacy among students, emphasizing improvements in technical proficiency, refereeing skills, and ethical awareness. By integrating basketball skill development with referee training, the curriculum effectively enhanced students' competence, confidence, and understanding of the sport's rules and behavioral norms. Statistical analyses reveal significant improvements in basketball skills, such as dribbling, shooting, and layup accuracy, alongside increased knowledge of game rules, violation penalties, and special case handling. Furthermore, advancements in referee gestures and professional qualities indicate the curriculum's success in cultivating practical officiating skills and instilling values of fairness and responsibility. Students demonstrated their capability and preparedness by successfully passing third-level referee certification exams, underscoring the curriculum's effectiveness in equipping them with technical and cognitive competencies essential for active and informed participation in basketball. The structured approach also facilitated a deeper understanding of tactical decision-making and game analysis, encouraging students to engage with basketball as players, referees, and lifelong participants in physical activity. This curriculum exemplifies integrating skill-based learning with ethical and cognitive development, promoting holistic physical literacy that aligns with contemporary educational goals and lifelong engagement in sports.

CONCLUSION

This study provides a comprehensive evaluation of the basketball skills and referee curriculum at Xinxiang Medical University, highlighting its strengths and opportunities for enhancement within the physical literacy framework. The curriculum's structure, divided into primary and advanced levels, effectively supports students of varying skill levels by focusing on foundational techniques for beginners and advanced tactics for more experienced students, thereby nurturing core aspects of physical literacy: competence, confidence, and motivation. However, the curriculum would benefit from a stronger emphasis on refereeing skills, which are crucial for developing well-rounded proficiency in basketball and fostering students' understanding of sportsmanship and fair play.

By implementing an enhanced curriculum that integrates refereeing content, diverse instructional methods, and a refined evaluation framework, students demonstrated significant improvements not only in their technical basketball skills—such as dribbling, passing, and shooting—but also in their capacity to apply these skills in realistic, game-like scenarios. Additionally, essential elements of physical literacy, such as teamwork, communication, and strategic thinking, were strengthened, creating an environment of collaboration and mutual respect. Pre- and post-intervention assessments confirmed the curriculum's positive impact, underscoring the value of a holistic approach that builds individual skills alongside collaborative capabilities among college students.

This study suggests that ongoing curriculum development, focusing on relevant content and motivational assessment practices, can substantially enhance teaching quality and promote the development of physical literacy in sports education. By fostering individual technical skills and broader social and ethical competencies, this curriculum model demonstrates a powerful potential to support students' journey toward lifelong engagement in physical activity and a deeper appreciation of basketball as a dynamic, inclusive sport.

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