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Table Tennis Elective Course Evaluation Indicators System and Standard Formulation

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ABSTRACT

Table tennis has been incorporated into physical education courses in most colleges and universities in China; establishing evaluation standards in the reform of public physical education elective courses is an effective measure. Taking the establishment of evaluation standards for elective courses of table tennis as an example, the standards are as follows: (i) In the evaluation indicators system of table tennis elective course, the first level indicators include general physical fitness and table tennis skills. The second-level indicators include sit-ups for girls and push-ups for boys, and forehand and backhand serve, forehand stroke, and backhand stroke. (ii) Use the deviation method to develop five-level evaluation criteria to evaluate the eight third-level norms, namely, excellent, good, medium, lower, and poor. Establishing evaluation standards for table tennis elective courses significantly promotes students' physical literacy by systematically enhancing their physical fitness, technical skills, and confidence in movement through a structured, multi-level assessment framework.

Key words: Table Tennis Elective Course, Evaluation Indicators System, Evaluation Criteria, Physical Literacy

INTRODUCTION

Physical education in colleges and universities serves as a critical platform for cultivating "physical literacy," empowering students with the knowledge, skills, and motivation needed for lifelong engagement in physical activity. Through scientifically designed programs, students develop their physical fitness and a deeper understanding of how to integrate physical activity into their lives meaningfully. Physical literacy emphasizes not only the improvement of physical capabilities but also the nurturing of positive attitudes and values surrounding health and fitness. College physical education thus equips students with the competencies necessary to maintain their physical well-being independently, fostering the personal agency and motivation to pursue an active, healthy lifestyle well beyond their academic years.

Table tennis is an ideal component within the physical education curriculum for fostering physical literacy. Its popularity and accessibility make it an excellent option for students of varying skill levels, as it encourages them to develop technical skills while understanding the activity's broader physical, mental, and social benefits. Table tennis helps students build coordination, agility, and self-confidence by emphasizing mastery of foundational skills and strategic thinking. These elements are crucial in developing physical literacy, as they enable students to see the value of physical activity and feel competent in their abilities to engage in it. Moreover, the low-impact nature of table tennis makes it a viable option for lifelong participation, aligning well with the goals of physical literacy to establish sustainable fitness habits (Kangrong, 2023).

Implementing standardized assessment indicators and evaluation standards within physical education programs is essential for measuring the development of students' physical literacy. These standards provide structured feedback highlighting students' progress in mastering specific skills, fostering self-reflection and goal-setting. Clear, measurable indicators reinforce students' sense of competency, a core aspect of physical literacy, as it motivates them to take responsibility for their physical fitness and approach it with enthusiasm and self-assurance. By setting benchmarks for achievement, these assessments guide students in recognizing their progress, encouraging them to value physical education as more than a course requirement and instead view it as a personal investment in lifelong health and wellness.

Such a focus on physical literacy aligns with broader health initiatives that encourage proactive management of personal well-being through continuous engagement in physical activity. Programs that promote physical literacy support the modern emphasis on "health first," fostering an understanding of exercise as a vital component of a well-rounded life. Physical literacy-oriented programs align with national fitness campaigns, reinforcing the importance of regular exercise as a fundamental component of quality of life. Through structured

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activities, personal goal-setting, and reflective evaluations, students are empowered to become independent, capable participants in their physical fitness journey, internalizing the value of physical activity as a lifelong pursuit (Bingchun, 2021).

In conclusion, emphasizing physical literacy in college physical education programs transforms students' engagement with physical activity, providing them with the skills and mindset necessary for a healthy lifestyle. With its adaptability and appeal, table tennis exemplifies a sport that fosters physical literacy, offering students the chance to develop physical skills and the confidence and motivation to pursue fitness throughout their lives. By focusing on structured skill-building and holistic assessment, physical education can create a foundation for students to embrace physical activity with competence and enthusiasm, ultimately contributing to a healthier, more active society that values the principles of physical literacy as essential to well-being.

RESEARCH OBJECTIVE

In the 2023-2024 academic year, 96 students from four randomly selected table tennis elective classes at Xinxiang Medical University, China, participated in this study as research subjects. Critical performance data were collected and analyzed to evaluate the course's impact on students' development of physical literacy, encompassing their physical fitness, technical skills, and confidence in table tennis. This study aims to provide insights into the effectiveness of elective sports courses in fostering physical literacy among university students by promoting athletic skill acquisition and a lifelong appreciation for and engagement in physical activity. By assessing various dimensions of physical literacy, the study seeks to demonstrate how structured sports electives can contribute to students' overall physical competence, motivation, and readiness for lifelong health and well-being.

METHODS

Literature Method

Through CNKI China, Pro Quest, ERIC, Google Scholar, the SCIE/SSCI/BP database, and other network information platforms for literature search, using the keywords "table tennis course," "table tennis training," "physical fitness training," "table tennis skills training," "table tennis evaluation indicators system," and so on, 58 literatures were selected to look for physical fitness and table tennis skills evaluation indicators.

Expert Interview Method

Several teachers engaged in public sports table tennis elective courses were interviewed to understand the evaluation indicators of different special courses so as to construct the evaluation indicators system for table tennis elective courses at Xinxiang Medical University of China.

Questionnaire Method

Through the questionnaire method, the evaluation indicators of table tennis elective courses in colleges and universities are sorted out, and an expert questionnaire is formed and sent to 5 experts. The questionnaire was distributed 1 to 1, and the recovery rate was 100%.

Mathematical Statistics

Using Excel software to make statistics on the expert questionnaire, determine table tennis public elective course teaching evaluation indicators. SPSS statistical software was used to collect the table tennis assessment data of students from 4 classes of elective courses at Xinxiang Medical University, and relevant materials were collected, sorted, and analyzed so as to obtain the scoring standard of table tennis elective courses.

RESULTS AND ANALYSIS

Table Tennis Elective Course Evaluation Indicators System

The evaluation indicators system for table tennis elective courses integrates vital aspects of physical literacy, focusing on physical fitness and specific table tennis skills. This approach is designed to support students' development of physical literacy by fostering technical proficiency in table tennis and broader physical competence, confidence, and motivation for lifelong engagement in physical activity. The study adopts a 5-point scoring system to evaluate these indicators, establishing that a score of 3.5 or above (out of 5) meets the minimum benchmark for achieving 70% of the total score. This standard reflects a sufficient level of physical literacy, where students demonstrate competence in physical fitness and sport-specific skills (Guanglong, 2014).

This evaluation framework quantifies performance and provides insight into students' journey toward physical literacy by emphasizing their ability to effectively engage in and enjoy table tennis as part of a balanced, active lifestyle. The system uses consistent, objective scoring to encourage students to build self-efficacy and a positive attitude toward physical activity, which are essential components of physical literacy. Additionally, this structured assessment highlights areas for improvement, empowering students to continue refining their skills and fitness and fostering a sustained commitment to physical activity that can extend beyond the classroom.

Physical fitness evaluation indicators

Cardiorespiratory endurance is the core element of physical fitness. It comprehensively reflects the body's ability to take in, transport, and use oxygen and is related to the heart pump function, the lung ventilation function, the blood circulation system's ability to carry oxygen, and the peripheral tissues, such as muscles' ability to use oxygen. Good cardiorespiratory endurance guarantees the health of the main functions of the body. Training in endurance fitness can not only improve the muscular and cardiovascular systems of the body but also positively impact the nervous system, so training in endurance fitness can promote the overall improvement of the comprehensive ability of the body (Kai, 2021). Since 2016, Xinxiang Medical University has emphasized in the

reform of public sports: endurance fitness as the basis for the development of other qualities. "5 Km Run" has been promoted as an essential physical fitness items in the 1-3 grades of the school, students' physical fitness test results have been significantly improved. Therefore, the "5 Km Run" is included in the physical fitness evaluation indicators. In addition, physical fitness training in table tennis teaching and training also includes push-ups and sit-ups, 1-minute single shake skipping rope, and other items.

According to the scores of five table tennis experts (Table 1), the evaluation indicators of physical fitness were finally determined as follows: 5 km run (Hailian, 2019), push-up (male), and sit-up (female) (Fengxian & Daoming, 2017), 1-minute single shake skipping rope (Yingqiu & Yongan, 2015).

Table tennis skills evaluation indicators

The evaluation indicators for table tennis skills in college programs are structured to support student physical literacy development by focusing on essential techniques. These indicators include core skills such as the forehand stroke, backhand stroke, forehand serve, backhand serve, forehand and backhand rubs, left push right attack, and serve rush attack. These foundational movements are selected with beginners in mind, emphasizing techniques that build the essential physical competencies necessary for effective engagement in table tennis. Given that the course is aimed at students with limited prior experience in the sport, the evaluation system prioritizes skills that are both accessible and crucial for nurturing physical literacy.

By focusing on these core skills, as Yue (2017) highlighted, the evaluation framework supports students in developing confidence, control, and understanding of table tennis. This approach allows students to gain familiarity with the sport's fundamental techniques, instrumental in cultivating competence and motivation—critical elements of physical literacy. As students gain proficiency in these foundational skills, they improve their technical abilities and build a positive attitude toward physical activity, fostering a sense of achievement and readiness to continue exploring and engaging in the sport. Through this foundational skills assessment, the course equips students with the physical literacy needed to enjoy and benefit from table tennis as a lifelong physical activity.

According to the scores of experts (Table 2), the evaluation indicators that ultimately determine table tennis skills are forehand stroke and backhand stroke, forehand serve, and backhand serve.

Table 1. Physical fitness experts score table

Gender	Physical fitness	Average score
Boy student	5 km run	5
	Push-up	3
	1-minute single shake skipping rope	4
Girl student	5 km run	5
	Sit-up	3
	1-minute single shake skipping rope	4

Based on the above indicators, the evaluation indicators system of table tennis elective course is established, as shown in Table 3.

Formulation of Evaluation Criteria for Table Tennis Elective Courses

A total of 96 table tennis elective students at Xinxiang Medical University were tested, and the evaluation criteria of excellent, good, medium, lower, and poor were determined by the deviation method.

Deviation method

The deviation method, often applied in assessing physical literacy, uses the standard deviation of data as a measurement unit, with the mean serving as a central reference point for setting evaluation criteria. This method offers a robust framework for evaluating the range of competencies associated with physical literacy, such as movement skills, confidence, and motivation in physical activity (Zhonglin et al., 2020). To effectively apply this method, it is first necessary to confirm that the original dataset reflects a standard distribution curve, ensuring that the criteria align with the typical spread of students' physical literacy levels. This step is essential for generating reliable assessments that reflect actual variations in physical competencies.

When the data presents a normal distribution, evaluation criteria can be developed by designating the mean of the data as the base value, with the standard deviation representing the spread of scores around this mean. This approach allows for creating benchmarks highlighting how students'

Table 2. Table tennis skills experts scoring table

Table tennis skills	Average score
Forehand stroke	3.5
Backhand stroke	4.5
Forehand serve	4
Backhand serve	4

Table 3. Table tennis elective course evaluation indicators system

Level 1 indicators	Level 2 indicators
Physical fitness	5 km run
	Push-up/sit-up
	1-minute single shake skipping rope
Table tennis skills	Forehand stroke
	Backhand stroke
	Forehand serve
	Backhand serve

Table 4. Sit-up and push-up assessment indicators

Items	Gender	*p*-Value
Sit-up (1 min)	Female	0.232
Push-up (1 min)	Male	0.102

Table 5. Evaluation criteria of sit-up and push-up assessment indicators (times/min)

Items	Gender	Excellent	Good	Medium	Lower	Poor
Sit-up	Female	Above 45	39-45	27-38	21-26	Below 21
Push-up	Male	Above 36	31-36	20-30	15-19	Below 15

physical literacy skills differ relative to the group average. In this case, the mean acts as a central reference for understanding typical levels of physical literacy. At the same time, the standard deviation illustrates variations in students' confidence, knowledge, and proficiency in physical activities. By structuring assessments, educators can provide targeted feedback, helping students understand their progress within the broader scope of physical literacy development and identify specific areas for improvement. This nuanced evaluation supports a personalized approach to physical literacy, encouraging continuous growth and engagement in physical activity as a lifelong pursuit (Weiwei, 2013).

Development of evaluation criteria for physical fitness

In the evaluation process, the "5 km run" is critical to fostering physical literacy among students. Each exam student must complete this 5 km run, emphasizing the importance of endurance, personal commitment, and resilience, which are integral aspects of physical literacy. Notably, this run needs to be timed, which removes the pressure of competitive grading and instead focuses on encouraging students to reach the finish line, promoting a sense of accomplishment and intrinsic motivation. There is no specific grade associated with the 5 km run; instead, it is evaluated on a simple basis of "completed" or "unfinished." All participating students completed the run, demonstrating their capacity to set and achieve personal physical goals. This approach aligns with the principles of physical literacy by valuing effort, persistence, and the development of positive attitudes toward physical challenges over performance metrics, supporting students in building a lifelong commitment to physical activity (Li, 2015).

Physical fitness evaluation indicators: sit-up (female) and push-up (male). After testing, the significance of each indicator is more significant than (p>.05) (Table 4), so it presents a normal distribution, and the deviation method can be used to establish the standard (Table 5).

Physical fitness evaluation indicators: male and female 1-minute single shake jump rope; after testing, the significance of each indicator is more significant than (p>.05) (Table 6), so it presents a normal distribution, and the deviation method can be used to establish the standard (Table 7).

Development of evaluation criteria for table tennis skills

Table tennis skills evaluation indicators: forehand stroke and backhand stroke, forehand serve and backhand serve; after testing, the significance of each indicator is more significant than (p>.05) (Table 8), so it presents a normal distribution, and the deviation method can be used to establish the standard (Table 9).

The study results indicate that students' physical literacy in the table tennis elective course at Xinxiang Medical University can be effectively assessed using a structured indicators system and the deviation method. Physical literacy indicators related to fitness, such as the 5 km run, gender-specific exercises (push-ups for males, sit-ups for females), and the 1-minute single shake jump rope, exhibited a normal distribution, enabling reliable categorization of students' performance into levels: excellent, good, medium, lower, and poor. This framework supports a well-rounded evaluation of students' physical competence, endurance, and resilience—key components of physical literacy.

Table 6. 1-minute single shake jump rope assessment indicators

Items	Gender	p-Value
Jump rope	Male	0.202
	Female	0.341

Similarly, indicators of table tennis skills, including forehand and backhand strokes and serves, also followed a normal distribution, confirming the deviation method's suitability for establishing skill-level standards. This systematic, data-driven approach provides fair and standardized assessment criteria and encourages students to develop confidence, motivation, and proficiency in physical activities. By measuring physical fitness and sport-specific skills, the evaluation system aligns with the broader objective of fostering students' physical literacy, ensuring they develop the skills, knowledge, and attitudes necessary for lifelong engagement in physical activity.

DISCUSSION

The study at Xinxiang Medical University provides a valuable framework for evaluating physical literacy within table tennis elective courses. However, various perspectives emerge on designing and implementing such an evaluation system. One view supports the comprehensive inclusion of physical fitness and table tennis skills, arguing that this balanced approach effectively addresses the multifaceted nature of physical literacy. Proponents suggest combining fitness indicators, such as endurance and strength, with skill-based assessments like forehand and backhand to nurture students' competence, confidence, and motivation for lifelong engagement in physical activity. Using the deviation method to standardize these indicators is also viewed positively, as it provides a scientifically grounded approach for objective, comparable assessment outcomes.

On the other hand, emphasizing fitness and technical skills equally may overlook the individualized nature of physical literacy development. Critics propose that a more flexible evaluation model could better accommodate students with diverse physical abilities and prior experience levels, encouraging personal growth rather than comparison against

Table 7. Evaluation criteria of 1-minute single shake jump rope assessment indicators (times/min)

Items	Gender	Excellent	Good	Medium	Lower	Poor
Jump rope	Male	Above 180	150-179	120-149	90-119	Below 89
	Female	Above 160	130-159	100-129	70-99	Below 69

Table 8. Table tennis skills assessment indicators

Items	*p*-Value
Forehand stroke	0.152
Backhand stroke	0.325
Forehand serve	0.218
Backhand serve	0.262

Table 9. Evaluation criteria of table tennis skills assessment indicators (times/min)

Items	Excellent	Good	Medium	Lower	Poor
Forehand stroke	40 Above	30-39	20-29	10-19	9 Below
Backhand stroke	40 Above	30-39	20-29	10-19	9 Below
Forehand serve	30 Above	21-29	12-20	6-11	5 Below
Backhand serve	30 Above	21-29	12-20	6-11	5 Below

standardized criteria. They suggest that expanding the system to include qualitative assessments—such as self-reflection on physical activities, goal-setting, or self-evaluation of effort and progress—might more accurately capture students' development in physical literacy, focusing on intrinsic motivation and personal empowerment.

Another perspective questions whether physical literacy, as a concept, can be fully captured through structured assessments alone. Supporters of this view emphasize that while standardized assessments provide valuable benchmarks, they might not address the broader, holistic goals of physical literacy, which include lifelong enjoyment and participation in physical activities. These advocates argue for a more integrated, less rigid approach incorporating diverse learning environments, such as group activities, creative games, or real-world application skills, to foster technical proficiency and a genuine enjoyment of physical activity.

Ultimately, while the study underscores the potential of a structured evaluation system in fostering physical literacy, it opens a dialogue on the need for adaptable, student-centered assessment models in physical education. Each viewpoint contributes to an evolving understanding of physical literacy development, suggesting that combining quantitative and qualitative measures may offer a more comprehensive, individualized approach. Balancing standardized assessments with flexible, experience-driven evaluations could support both skill acquisition and the personal growth necessary for students to adopt physical activity as a lifelong pursuit.

CONCLUSION

The course evaluation indicators system is a comprehensive framework designed to assess various aspects of the table tennis elective course, including its structure, implementation, and outcomes, to determine whether it fulfills its educational goals and promotes physical literacy among students. In this study, the evaluation indicators system holistically evaluates students' learning outcomes and course coherence in the table tennis elective at Xinxiang Medical University, strongly emphasizing fostering physical literacy. This comprehensive approach ensures that the selected evaluation contents and methods effectively align with educational objectives, emphasizing the reliability and validity of the evaluation indicators to support students' development of physical literacy.

The study employs the deviation method as its primary evaluation technique, integrating first-level indicators for physical fitness and table tennis skills. Secondary indicators include the 5 km run, gender-specific exercises (push-ups for males, sit-ups for females), a 1-minute single-shake jump rope, forehand and backhand strokes, and forehand and backhand serves. Expert assessments yielded an average score of 4 points for physical fitness and table tennis skills, with significant results ($p > .05$), indicating the evaluation indicators' high reliability, validity, and scientific rigor. This structured approach supports students in developing technical skills and the confidence, motivation, and competence that are essential components of physical literacy.

Public university physical education courses focus on sports-specific skills and holistic physical development, which is essential for nurturing physical literacy. The diversified assessment system in this table tennis course underscores the importance of balancing skill acquisition with physical fitness improvement, contributing to students' overall physical literacy. By helping students develop both learning skills and physical fitness, this evaluation system positively impacts their capacity for lifelong engagement in physical activity, promoting a well-rounded approach to their growth and development.

Establishing the evaluation indicator system for the table tennis elective course at Xinxiang Medical University further supports the institution's commitment to advancing public sports reform and addressing students' developmental needs.

Aligning the system with the physical fitness and skills-specific demands of table tennis provides a structured foundation for the sustainable development of table tennis electives in higher education. This approach reinforces students' physical literacy and fosters a supportive environment for their long-term engagement in physical activities, contributing to their health and well-being well beyond university life.

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