# Research on the Application of Big Data Technology in Sports Core Literacy Education: Learning Models, Teaching Strategies, and Internal Relationships

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**Abstract:**

The cultivation of core literacy is crucial in discipline teaching, and its effective implementation requires the integration of advanced technologies, particularly big data. This paper focuses on the application of big data technology in the teaching and learning of sports core literacy, emphasizing the use of computational methods to promote the transformation of knowledge and skills. The concept of sports core literacy is explored through the lens of big data platforms, which are utilized to create dynamic learning environments that facilitate the integration of sports knowledge, health knowledge, and sports moral knowledge. The paper proposes a big data-driven learning model that focuses on knowledge acquisition, skill development, and the transformation of knowledge and ability. By analyzing the relationship between these three dimensions—sports ability, health behavior, and sports morality—it highlights how big data technologies can track, analyze, and promote the development of students' physical and cognitive capabilities. Furthermore, the paper presents teaching strategies based on hierarchical cultivation and personalized learning, aiming to address the common challenges in sports education, such as students' lack of engagement, insufficient practice, and limited physical ability.

**Keywords:** Big Data, Sports Core Literacy, Learning Models, Teaching Strategies, Computational Methods, Knowledge and Ability Transformation, Sports Education.

## INTRODUCTION

The introduction of big data technology into the field of education, particularly in sports and physical education, provides a transformative approach to improving teaching strategies and student outcomes. Big data tools offer insights into the learning behaviors, progress, and needs of students, thereby enabling personalized and data-driven teaching. In sports education, where physical skills, health knowledge, and moral development intersect, the use of big data technologies can play a critical role in enhancing the cultivation of sports core literacy.[1]

Sports core literacy includes the three essential dimensions: sports knowledge, health behavior, and sports morality. Each of these dimensions requires systematic and targeted development. Traditional teaching methods, however, often fall short in effectively nurturing these competencies due to their lack of personalization and real-time feedback. With the integration of computational methods such as machine learning, data analytics, and learning analytics, big data technologies can provide teachers with detailed insights into students' performance, helping them to tailor instruction more effectively.

Current research in physical education has explored the general design and implementation of sports core literacy curricula, but there is limited focus on leveraging big data to inform teaching practices. This paper seeks to bridge that gap by proposing a big data-driven learning model for sports core literacy. The model emphasizes the dynamic relationship between knowledge, ability, and behavior, and incorporates computational tools to track and support the development of students' sports capabilities.[2,3]

Through big data platforms, it is possible to create adaptive learning environments that adjust to students' individual needs. For example, real-time performance data can be collected through wearables or motion sensors, while health behavior can be monitored through apps and fitness tracking devices. This data can be analyzed to identify patterns, predict future performance, and suggest targeted interventions. Furthermore, big data methods can be used to evaluate the effectiveness of different teaching strategies, ensuring that instructional methods align with students' learning trajectories.

By examining the potential of big data to enhance the relationship between the cognitive, skill-based, and behavioral dimensions of sports literacy, this paper outlines strategies that can guide the implementation of big data in sports education. Specifically, it addresses the creation of practical scenarios that facilitate the transformation of theoretical knowledge into applied skills, as well as the development of teaching strategies that ensure a progressive, data-driven approach to sports literacy education. Ultimately, the goal is to overcome the common challenges in physical education—such as student disengagement and limited physical practice—through data-informed solutions that personalize learning and foster long-term athletic development.

## REALISTIC THINKING ON CULTIVATING CORE SPORTS LITERACY

## The Misunderstanding of the Internal Relationship of Sports Core Literacy

### *Dislocation of the relationship in the cultivation of sports core literacy*

Under the influence of the "discipline centered view" [4] and the idea of subjectivism, physical education teaching pays attention to the teaching of knowledge, technology and skills. In terms of knowledge, technology and skills, mastering these is more to get good grades. The teaching begins here, which is out of touch with the students' own life and spirit. The learning of ability, spirit and behavior is to serve and meet the standards in order to better master the "three basics". Education should not be taught for the sake of imparting knowledge or technology, but should return to the standard of educating people and implement "cultivating people by virtue". Physical education and health course teaching is an important means of physical education. As an important part of education, the ultimate goal is not to impart knowledge or technology, but to serve the education through this way. The talents needed by the society are by no means individuals with only knowledge and ability, but all-round talents with perfect unity of ability, spirit and morality. Therefore, physical education teaching should make students' core qualities, such as knowledge, ability and character, which meet the needs of lifelong development and social development, relate and influence each other, develop in an all-round way in the course of teaching, and play an integral role in solving practical problems in complex situations, [5] cultivate people who can adapt to social development with both ability and political integrity.

### *The separation of the cultivation of sports core literacy*

Sports core literacy is not simply about cultivating students' knowledge and skills, but rather their ability to solve problems in complex situations. [6] The mastery of knowledge and the development of ability should become an integral part of people's literacy. Without people's literacy, or knowledge and ability that have not been transformed and internalized into literacy, they are just symbols, labels and decorations, which are virtual, empty, fake and pseudo, not even a kind of good energy, but may become an evil force against literacy and morality. Therefore, education should not only transform knowledge into ability, but more importantly, connect knowledge with people's life and spirit, so that people become rich in spirit, noble in moral character, full of wisdom and happiness because of knowledge and learning, and life becomes more meaningful and valuable. [7]

However, the current teaching process lacks guidance on core competencies in the field of physical education, and there is a lack of "soft connection" [8] between physical education teaching and core competencies in the subject. The various dimensions of cultivated competencies cannot be effectively transformed into students' abilities. The realistic dilemma of students' "not being able to exercise, unwilling to exercise and unable to exercise" is the epitome of the present situation of various literacy cultivation. "Can't exercise" means that the knowledge, techniques and methods mastered by students have not been transformed into the ability to be used in practice, which is not enough to be applied in sports; "Unwilling to exercise" means that students don't really connect sports with their own life and health, and their knowledge of the value of sports to people is not internalized into the internal motivation of individual sports, which makes their subjective willingness to participate in sports insufficient to promote their participation in sports; Apart from some congenital reasons, "unable to exercise" is largely due to physical health but poor function and quality of various organs, which is easy to cause problems, and then it is considered as unable to exercise. If in the cultivation of students' sports core literacy, knowledge and skills learning can be comprehensively transformed and applied in depth, physical exercise can be deeply involved, and knowledge transformation ability and moral situation can be provided, these conditions will be greatly improved.

## The Status Quo of Sports Core Literacy Cultivation

### *Shallow training of sports knowledge and skills*

The situation of emphasizing practice over theory and skills over knowledge in physical education teaching is not only reflected in the weak knowledge theory of physical education teachers themselves, but also in the lack of breadth and depth of knowledge transmission in specific physical education teaching, resulting in the phenomenon that teachers can't teach, teach and students can't understand and learn. In terms of mastering skills, compared with knowledge learning, students are more willing to participate in learning. However, due to the lack of connection between school physical education courses, the learning of sports skills is low-level repetition and fragmentation. In addition, due to the baton of reaching the standard and assessment, the emergence of "exam oriented sports" and "exam oriented sports" is highlighted [9], the school tests what to learn and what to practice, [10] which also makes students' physical education study mostly stay under the purpose of meeting the standard assessment, and it is difficult to achieve in-depth learning of knowledge and skills. On the other hand, the current system of physical education learning objectives is not sound and complete, and there is a lack of detailed basis for setting learning objectives during class hours, which affects the implementation of core sports literacy goals. [11]

*Nothingness of sports moral cultivation*

Under the influence of the traditional physical education teaching thought of "main wisdom", school physical education teaching focuses on teaching the three basics, ignoring the cultivation of students' emotions, emotions and morality, and the teaching content and methods are set for imparting knowledge and skills, lacking the content and methods of developing students' sports morality, which makes the cultivation of sports morality a nominal goal. The content and methods of developing students' sports ethics only remain oral, and the phenomenon of physical and mental separation in the cultivation of sports ethics. [12] On the other hand, in the teaching reform, the alienation of teachers' understanding of stimulating interest and "student-centered" makes physical education with a certain intensity and density become a "three noes and seven noes" physical education class that caters to students. This "no intensity, no confrontation, no collision, no sweating, no dirty clothes, no panting, no wrestling, no skin rubbing, no injury and no long-distance running" physical education class makes sports moral.

*Cultivation of sports healthy behavior*

Physical education is a practical educational activity of health education. In the process of physical education, due to the influence of long-term "three basics" education, physical education focuses on imparting sports knowledge, technology and skills. The teaching of health knowledge was mentioned after the 2011 curriculum standard, but it is rarely involved in actual teaching. The lack of knowledge makes the cultivation of health awareness and habits lack the necessary premise, which affects the further formation of healthy behavior. On the other hand, the ability of emotional regulation and environmental adaptability can only be improved through personal experience in complex situations, and it is difficult for physical education class, who has "three noes and seven noes", to provide students with in-depth experience situations, which makes the cultivation of healthy behaviors nothing.

## SPORTS CORE LITERACY TRAINING LEARNING MODEL

### The Essence of Improving Sports Core Literacy

In Chen Yanfei's division of the learning objectives of sports core literacy, it is considered that the formulation of sports ability learning objectives should consider three dimensions: physical fitness, sports cognition and technical and tactical application, sports display or competition; The goal of healthy behavior learning should consider four dimensions: awareness and habit of physical exercise, mastery and application of health knowledge and skills, emotional regulation and environmental adaptation; The study goal of sports morality should consider three dimensions: sports spirit, sports morality and sports character. [13] According to Tommy Soschi's knowledge structure model, skills include cognitive skills, motor skills, reaction skills and interactive skills. Among them, reaction skills are the responses to things, situations or people according to values, emotions and emotions, and interactive skills refer to the interaction between people to achieve certain goals, such as communication, acceptance and persuasion. [14] The formation of sports core literacy can also be summarized as knowledge and skills. Moreover, knowledge and skills are not isolated and irrelevant in the learning process. In the formation of skills, learners need to use their stored knowledge to participate in the decision-making of experience and practice, thus promoting the efficiency of practice and experience and then forming skills. On the other hand, the formation of learners' ability can effectively deepen the study of related knowledge. Based on this, it is considered that the formation of sports core literacy is essentially a process of mutual promotion and transformation of sports knowledge and skills.

### Sports Knowledge Literacy Training Learning Model

Knowledge refers to the information stored in learners' minds, which has the nature of "being or not". [14] According to Chen Yanfei's learning goal dimension of sports core literacy, we integrate sports theoretical knowledge, technical and tactical knowledge, health knowledge and sports moral content knowledge into the content of sports knowledge learning. According to the basic mechanism of knowledge construction in constructivism theory, knowledge learning can be divided into three stages: knowledge generation and understanding, knowledge integration and deepening, and knowledge application and migration. However, there is a non-hierarchical relationship between different knowledge contents. Therefore, we express the learning model construction of sports knowledge training as shown in Table 1.

Table 1. Learning model of sports knowledge literacy training

| Romososki's knowledge type | Content of sports core literacy knowledge | Target levels |
|---|---|---|
| Fact | Refers to the relevant facts, procedures, concepts | The three stages of constructivist |
| Procedure | and principles of sports stored in learners' minds. By | learning theory: generation and |

| Concept Principle | sports theory knowledge and technical and tactical knowledge, health knowledge, sports moral content knowledge, etc | understanding, integration and deepening of knowledge, application and transfer of knowledge |
|---|---|---|

## Learning Model of Sports Skill Literacy Training

Skill is defined as a certain way of action or intellectual activity formed by individuals through practice by using existing knowledge and experience. [15] In Soschi's skill classification, skills are divided into four categories: cognitive skills, psychomotor skills, reaction skills and interactive skills. This classification method regards cognition, psychological action, attitude and social interaction as the content of skills. [14] Therefore, in the field of sports core literacy skills, we can set the following learning model (Table 2). Of course, the types and target levels of these levels are not absolutely isolated or from low to high, and there will be cross-related content, and sometimes they will coexist in some practical scenarios during the formation process, such as in sports competitions.

Table 2. Learning model of cultivating sports skill accomplishment

| Romososki skill types | Core sports literacy skills content | Target levels |
|---|---|---|
| Cognitive Skills (Thinking Skills) | Sports cognition, such as perception of the height, space, intensity, and rhythm of body movements, decision-making, problem-solving, logical thinking, etc. | From low to high, there are six levels: memory, understanding, application, analysis, evaluation, and creation (Bloom). |
| Psychomotor skills | Sports skills, such as body movements, perceptual movement skills, repetitive or automated movements, as well as body movement strategy or planning skills, and movement innovation skills. | From low to high: perception, set, guided reactions, mechanical actions, complex explicit reactions, adaptation, innovation (Simpson). |
| Reaction skills | Consciousness and habit of physical exercise, self-attitude, emotion, habit, self-control and management, self-sports morality in sports exhibition and competition). | From low to high, it includes: acceptance, reaction, formation of values, organizational value system, and personalized value system (teaching objectives in the field of Kraswall's emotions). |
| Interactive skills | The ability to lead, supervise, communicate, educate, accept, persuade, discuss, and engage in collective behavior and morality with others in sports collective activities. | From low to high: perception, recall, planning, and execution performance [15] |

## Transformation Model of Sports Knowledge and Ability Literacy

Xue Zhaoming believes that there is a separation between physical practice and rational cognition in current physical education teaching practice, which makes it difficult for students to learn and apply. [16] We know that knowledge arises from the accumulation and summary of a large amount of practical experience, and guides scientific practical activities. Skills come from practical exercises guided by existing knowledge. At the same time, good skills can promote the smoothness and efficiency of our practical activities and strengthen the application of knowledge. It can be seen that practice is a key link in the transformation of knowledge and skills. In the transformation of knowledge and skills, we should pay attention to the setting of practical scenarios, form skills in practical practice, and derive knowledge from the summary of practical experience. Therefore, we can represent the transformation of sports knowledge and skills as shown in Figure 1.
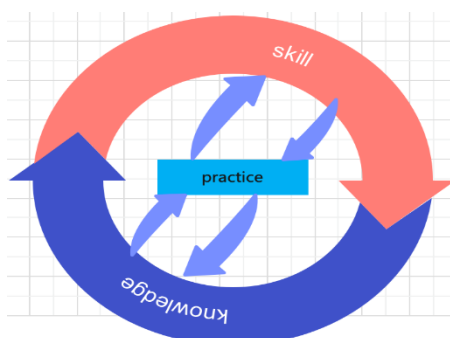
Figure 1. Sports knowledge and skills transformation model

Physical education and health course is a course with physical exercise as the main means, physical education and health knowledge, skills and methods as the main learning content, and the main purpose of developing students' core literacy and improving physical and mental health. [5] The core competencies of physical education need to be developed through specific and meaningful teaching contexts, [17] because the formation of core competencies in physical education is mostly carried out through physical exercise and physical participation, and the transformation of sports knowledge and ability is mainly carried out in the process of physical exercise and motor skill learning, which is determined by the nature of sports. The new curriculum standard puts forward the index requirement of physical education class density and intensity, which is an important guarantee for the transformation of sports knowledge and skills. On the other hand, the requirement of "learning, diligent practice and regular competition" requires that each class should have some antagonistic activities or competitions, which provides a way for practical practice for the ability of knowledge transformation. In addition, hierarchical teaching, inquiry teaching and cooperative teaching are also important ways to realize knowledge and skills.

## TEACHING STRATEGIES FOR THE CULTIVATION OF SPORTS CORE LITERACY

### Sports Knowledge Literacy Training Teaching Strategies

In the sports knowledge learning model, there are sports theoretical knowledge, technical and tactical knowledge, health knowledge, sports moral content knowledge and so on at the level of sports core literacy knowledge. Constructivism learning theory and Bloom's hierarchical theory of knowledge level all think that the process is from low to high. However, in the actual physical education teaching, we pay more attention to the learning and practice of physical fitness and movement techniques, and less attention to the knowledge theory involved in physical fitness and technical exercises, which shows that the learning involving knowledge only stays at the level of telling the name and practice, and rarely goes deep into the level of why to practice and why to practice like this, which leads to the phenomenon that students can't learn, can't understand and can't apply it. Therefore, in the process of physical education teaching, in order to cultivate knowledge literacy, we should pay attention to the hierarchical setting and learning of physical fitness, technology and methods, and try to set up the link of presenting, exploring and discovering the relevant knowledge points involved in sports movements from low level to high level, so that students can really know their names, understand their principles and actively integrate and apply them in this process.

### Teaching Strategies for the Cultivation of Sports Skill Accomplishment

In the improvement of sports skills, the current skills training pays more attention to cognitive skills and motor skills, but it stays at a lower level. Lack of high-order thinking ability in application, synthesis and evaluation of cognitive skills; The mastery of motor skills mostly stays at the level of perception, posture and mechanical action, and the low-level repetition is more. Of course, it is difficult to form some high-level skills in teaching, such as innovative skills and automation skills, but it is difficult to continuously stimulate students' learning motivation and help them form sports expertise and hobbies if they are only low-level repetition of motor skills. Therefore, hierarchical teaching for students with different skill levels is particularly important. On the other hand, the cultivation of reaction skills and interaction skills is less involved in teaching. In addition, the teaching of single motor skills, "three noes and seven noes" and "herding sheep" in physical education class are difficult to create an exercise situation for the formation of these skills. Therefore, intensive sports and "regular competition" in physical education class are important ways to cultivate these skills.

### Sports Knowledge, Ability, Emotional Transformation Strategy

Wang Peifang believes that the relationship between knowledge and ability is not linear, and the transformation from knowledge to ability is restricted by intermediary variables such as knowledge type, learning strategy and learning situation. The transformation of knowledge into ability requires the mutual transformation between declarative knowledge and procedural knowledge, and strategic knowledge regulates the learning of declarative knowledge and procedural knowledge. [18] And those strategic knowledge and procedural knowledge are mostly the content of ability and emotion. Therefore, when we are transforming sports knowledge and ability, we should first pay attention to correctly understanding and treating the relationship between them. Secondly, according to the model of knowledge-to-energy transformation, we can know that the formation and promotion of sports skills need a lot of practical exercises under the mastery of sports-related knowledge. Shao Weide et al. believe that the singularity of learning scenario design can lead to slow transfer of students' motor skills [19]. Liu Xin believes that most learning tasks and content are detached from students' life experiences, and there is a lack of design for complex scenarios such as different life and sports scenarios. [20] To guide students to apply the knowledge and skills they have learned to practical sports competitions and demonstrations, as well as real-life situations. [21]

Therefore, while widely popularizing knowledge with storage properties, creating a process of applying knowledge for practical practice is an important way to transform knowledge into ability, improve cognitive skills, motor skills, reaction skills, and interaction skills, and enhance physical literacy. Big data provides the possibility to create such practical practice scenarios. Once again, when it comes to improving skills such as awareness, behavior, emotions, character, ethics, and communication, it is necessary to learn relevant knowledge as a guide, and to practice with a certain density and intensity of physical exercise and competition scenes. Finally, we should also pay attention to guiding students to reflect and explore knowledge while deepening and upgrading their skills, so as to promote the mutual transformation of knowledge and ability.

## CONCLUSION

To implement the problem of "how to cultivate" sports core literacy, we should clarify the essence of sports teaching training in three dimensions of sports core literacy: sports ability, healthy behavior and sports morality. The training process is the process of mutual transformation and promotion of sports knowledge literacy and skill literacy. Sports knowledge literacy refers to the information stored in learners' minds, and skill literacy is obtained through physical participation in practice and application on the basis of knowledge literacy. Sports knowledge literacy includes sports theory, technical and tactical knowledge, health knowledge and sports moral knowledge. Sports skill literacy includes cognitive skills, action skills, reflection skills and interactive skills. Reaction skills include sports emotions, emotions, self-control and morality, while interactive skills include group morality and communication, education and persuasion with others. Sports knowledge and skill literacy have their own development levels from low to high. In teaching, it is necessary to gradually improve according to the level of learners' knowledge and skill literacy, and to correctly view the relationship between the transformation of sports knowledge and skills. While widely popularizing knowledge with storage properties, big data technology and other methods can be used to create practical exercises and application scenarios for the transformation of knowledge and abilities, and ensure the intensity and density of practice, in order to achieve the mutual transformation of sports knowledge and skills, promote the deep development of sports learning, and cultivate students' core sports literacy.

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