

Logical rationale and practical paths of digital-intelligence empowerment for improving health education literacy of college physical education teachers

Jiangsong Chen

School of Physical Education and Health, Yancheng Teachers University, Yancheng, China

394712813@qq.com

Abstract. With the continuous advancement of educational digitalization and health education in colleges and universities, new requirements have been put forward for the professional literacy of college physical education teachers. Based on relevant policy documents and existing studies, this paper analyzes the connotation, improvement logic, realistic adaptation and practical paths of digital-intelligence empowerment for the health education literacy of college physical education teachers. The study holds that this literacy can be understood from four dimensions: health knowledge integration, health information interpretation, health education transformation, and digital-intelligence application and ethics. Its improvement stems from the expansion of health education goals, the integration of physical education and health knowledge, and the collaboration between professional experience and data evidence. At present, there is still room for further improvement in the embedding of health education roles, the connection between physical education and health knowledge, the educational transformation of health data, and relevant support mechanisms. To this end, it is necessary to strengthen the professional role cognition oriented by health promotion, build a knowledge system integrating physical education and health, form a capability chain of "data acquisition – information interpretation – educational decision-making – teaching intervention – feedback adjustment", and improve the support mechanisms of training, teaching and research, interdisciplinary collaboration and evaluation.

Keywords: digital-intelligence empowerment, college physical education teachers, health education literacy, teacher professional development, health promotion

1. Introduction

Health is an important foundation for the all-round development of students. Health education in colleges and universities not only undertakes the function of disseminating health knowledge, but also bears the important tasks of promoting the formation of healthy behaviors and improving students' independent health management ability. The *Guidelines for Health Education in Institutions of Higher Education* incorporates scientific exercise, exercise and health, self-monitoring of exercise load and other contents into college health education. The *Guiding Opinions on Comprehensively Promoting the Construction of Healthy Schools* further

emphasizes source prevention, systematic governance and precise intervention, and proposes to strengthen the monitoring of students' physical fitness and the application of results. In this context, the educational function of college physical education is no longer limited to the learning of sports knowledge and skills, and its role in physical fitness improvement, scientific exercise and healthy behavior cultivation is increasingly prominent. College physical education teachers have also become important participants in student health promotion. Educational digitalization provides new technical conditions for physical education teachers to perform the above duties. The *Teacher Digital Literacy* proposes that teachers should use digital evaluation tools to analyze students' situations, identify individual differences and carry out targeted guidance. After digital technology enters school physical education, information such as physical fitness tests, exercise load, physical activity and classroom performance can enter the teaching process more conveniently. Data has gradually become an important basis for teachers to understand students and adjust teaching [1], and the professional concepts, knowledge structure, teaching ability and professional roles of physical education teachers have also changed accordingly [2]. The term "digital-intelligence empowerment" in this paper mainly refers to the embedding of technologies such as data platforms, intelligent terminals, algorithm analysis and artificial intelligence into college physical education teaching, so as to provide technical support and capacity enhancement for college physical education teachers to carry out health education by expanding the acquisition of physical education and health information, assisting teachers' professional judgment, optimizing teaching feedback and supporting differentiated guidance. Digital-intelligence empowerment is not a replacement of technology for teachers' professional activities. Whether its role can be realized still depends on whether teachers can transform the information obtained through technology into professional judgment and educational actions.

Regarding the health education and digital professional development of physical education teachers, existing studies have generally formed two paths. First, focus on the health education literacy of physical education teachers. Lü Ke et al. discussed the cultivation of health education literacy of physical education teachers from the aspects of teacher training standards, curriculum systems and international experience [3]; Yin Zhihua et al. analyzed the core literacy of physical education teachers' health education from the aspects of health literacy, health emergency response, health communication and health education teaching [4]. Second, focus on the digital professional development of physical education teachers, covering research on the value, practical challenges and improvement paths of digital literacy of college physical education teachers [5], as well as the impact of digitalization on the professional concepts, knowledge and abilities of physical education teachers [2]. Relevant achievements have enriched the research on the professional development of physical education teachers from the two directions of health education and digital ability respectively. However, there is still room for further connection between the two research paths. On the one hand, existing studies on health education literacy are more based on the overall physical education teachers or teacher training system, and the discussion on specific professional scenarios such as college physical education courses, physical fitness tests and college students' scientific exercise guidance is relatively limited. On the other hand, research on digital literacy of college physical education teachers mostly focuses on digital awareness, technical knowledge, technical application and professional development, and the analysis of how digital information can be further transformed into health education actions can still be deepened. Especially after physical fitness and exercise data continuously enter college physical education teaching, information itself does not automatically form health education value. Teachers still need to go through processes such as information understanding, professional judgment, teaching transformation and feedback adjustment.

Based on this, this paper takes health education literacy as the core research object, and regards the empowering role of digital-intelligence technology as an important era condition affecting the professional

roles, knowledge structure and teaching methods of college physical education teachers. Compared with existing studies, this paper mainly carries out analysis from two aspects: first, it places the health education literacy of physical education teachers in the specific context of digital-intelligence-based physical education teaching in colleges and universities, and discusses its professional attributes and ability requirements; second, it shifts the focus of digital-intelligence ability from general technical operation to the educational transformation of physical education and health information, and attempts to construct a capability chain of "data acquisition – information interpretation – educational decision-making – teaching intervention – feedback adjustment". On this basis, it analyzes the logical rationale, realistic adaptation and practical paths of improving the health education literacy of college physical education teachers empowered by digital intelligence.

2. Connotation interpretation of digital-intelligence empowerment for health education literacy of college physical education teachers

2.1. Conceptual boundary of health education literacy

Health literacy and health education literacy are interrelated, but they point to different directions. Nutbeam placed health literacy in the framework of health education and health promotion, emphasizing the important role of health knowledge and related abilities in individual health behaviors [6]; Sørensen et al., on the basis of integrating existing definitions, summarized it as the knowledge, motivation and abilities required for individuals to acquire, understand, evaluate and apply health information, and make health judgments and decisions accordingly [7]. From this perspective, health literacy mainly focuses on individuals' ability to maintain and promote their own health.

Teachers' health education literacy has more distinct professional and educational attributes. For physical education teachers, the requirements include not only possessing corresponding health knowledge themselves, but also understanding students' exercise and health needs based on professional knowledge, and transforming relevant knowledge into educational practices that promote students' health cognition and healthy behaviors. Existing studies have carried out discussions from the aspects of physical education teacher training standards, curriculum setting and educational practice [3, 4], indicating that health education literacy has become an ability field that requires special attention in the professional development of physical education teachers. Health education literacy should not be confused with teachers' digital literacy. The *Teacher Digital Literacy* mainly emphasizes teachers' awareness, ability and responsibility to use digital technology to acquire, process, use and evaluate digital information, and discover and solve educational and teaching problems. Wu Di et al. further pointed out that in addition to digital technology application, teachers' digital literacy also involves digital responsibility and professional development [8]. The basic difference between the two is that health education literacy mainly answers whether teachers can effectively carry out health education, while digital literacy more answers whether teachers can reasonably use digital technology to improve education and teaching. After digital-intelligence technology enters physical education teaching, the two types of literacy intersect, but they do not lose their respective core orientations.

Accordingly, this paper defines the health education literacy of college physical education teachers as the comprehensive professional literacy possessed by college physical education teachers, who comprehensively apply physical education, health and related professional knowledge to reasonably identify, explain and make educational judgments on students' exercise and health information, and promote students to form health cognition, healthy behaviors and scientific exercise habits through physical education teaching, exercise

guidance and health education. Under the condition of digital intelligence, this literacy is also reflected in teachers' ability to reasonably use physical fitness and exercise data, digital platforms, intelligent equipment and artificial intelligence to assist teaching judgment, and abide by corresponding data ethics and professional norms.

2.2. Professional attributes of health education literacy

The health education literacy of college physical education teachers is not a simple extension of general health knowledge among physical education teachers, but a professional literacy determined by the characteristics of college physical education courses and teachers' professional practice. Traditional college physical education teaching mainly focuses on sports knowledge, skill learning and physical exercise, and teachers' professional abilities are correspondingly concentrated on movement demonstration, classroom organization, special guidance and sports evaluation. With the continuous deepening of the "health first" concept, the function of physical education courses in physical fitness improvement, scientific exercise and healthy behavior cultivation has been gradually strengthened. Existing studies have also proposed that the connection between school physical education and health education should be strengthened to give full play to the educational value of exercise in promoting health [9].

College physical education teachers have a relatively unique practice field of health education. On the one hand, teachers can observe students' sports ability, exercise behavior and classroom performance in continuous physical activities, and obtain relevant information through physical fitness tests; on the other hand, physical education courses have obvious physical practice attributes, which can directly embed health knowledge into sports experience, exercise organization and exercise guidance. Existing studies have pointed out that high-quality professional development of physical education teachers is no longer limited to the improvement of a single teaching skill, but pays more attention to the expansion of educational concepts, professional responsibility and comprehensive education ability [10]. This provides a professional development basis for college physical education teachers to further undertake health promotion responsibilities in physical education teaching.

Such professional advantages also have clear boundaries. Physical education teachers can interpret information related to physical exercise within their professional scope, identify sports problems worthy of attention and provide scientific exercise guidance, but they cannot make medical diagnoses based on physical fitness or exercise data. Problems beyond the scope of physical education, such as diseases and psychotherapy, should be referred to corresponding professional services in a timely manner. Therefore, the focus of improving the health education literacy of college physical education teachers is not to expand teachers' responsibilities, but to improve their educational ability to promote students' health development by leveraging the advantages of physical education expertise.

2.3. Four analytical dimensions of health education literacy

This paper does not regard the following four aspects as a fixed structure confirmed by scale development, factor analysis or other empirical tests, but takes them as theoretical dimensions for analyzing digital-intelligence-empowered health education literacy based on the basic process that college physical education teachers need to go through to complete health education tasks. Existing studies on digital literacy of physical education teachers have shown that teachers' digital ability involves multiple contents such as awareness, knowledge and skills, application, responsibility and professional development [11]; in the scenario of college physical education and health education, it is further necessary to consider how these abilities enter the process of physical education and health information understanding and educational transformation.

To carry out health education, college physical education teachers first need to have a professional knowledge base that can explain the relationship between exercise and health; when facing students' physical fitness and exercise information, they need to complete information understanding and professional interpretation; only when professional judgment is transformed into teaching content that students can understand and implement can actual educational actions be formed; after entering the digital-intelligence environment, the above processes are constrained by technical norms, data security and algorithm boundaries. Accordingly, a task process of "knowledge preparation – information interpretation – education transformation – technical norms" can be formed, which correspondingly manifests as four analytical dimensions. First, health knowledge integration literacy. On the basis of physical education professional knowledge, teachers need to establish connections among physical fitness, physical activity, scientific fitness, exercise safety and health behaviors, so as to connect motor skill teaching with students' health goals. The focus is not on adding scattered knowledge, but on forming a knowledge network that can serve specific physical education teaching and health guidance. Second, health information interpretation literacy. Teachers need to understand the basic meaning of information such as physical fitness tests, physical activity and exercise load, and make educational interpretations combined with students' exercise foundation and specific situations, so as to identify differences with teaching significance. The "interpretation" here emphasizes understanding and application in the sense of physical education, rather than disease diagnosis in the medical sense. Third, health education transformation literacy. Professional knowledge and information judgment only have health education value when they enter teaching practice. Teachers need to transform professional expressions into exercise suggestions that students can understand and implement, so that "professional knowledge – health explanation – teaching action – behavior promotion" forms a continuous process. Fourth, digital-intelligence application and ethics literacy. Digital-intelligence technology can broaden information sources and feedback methods, but also brings problems such as data privacy, information accuracy and algorithm dependence. Teachers need to select appropriate technologies according to educational goals and understand the norms and boundaries of technology use.

The four dimensions have a certain process correlation: health knowledge integration provides a professional foundation, health information interpretation completes the connection from information to judgment, health education transformation realizes the implementation from judgment to action, and digital-intelligence application and ethics run through them and constitute new technical conditions and normative requirements. This division is intended to provide a theoretical tool for subsequent analysis, rather than establishing a measurement model without empirical verification.

3. Logical rationale of digital-intelligence empowerment for improving health education literacy of college physical education teachers

3.1. Expansion of education goals: synergy of motor skill learning and health promotion

Sports knowledge and skills have always been important contents of college physical education courses, but the education goals of college physical education can no longer stay at whether students "can exercise", but also need to pay attention to whether students can exercise scientifically, exercise actively and improve health through exercise. The *Guidelines for Health Education in Institutions of Higher Education* has incorporated scientific exercise and exercise load monitoring into college health education, and the *Student Physical Fitness Strengthening Plan* further proposes to strengthen the application of physical fitness monitoring

results and establish a "monitoring – intervention" linkage mechanism¹. These requirements have strengthened the connection between motor skill learning and student health promotion. Accordingly, the professional ability requirements for college physical education teachers have also been expanded. When teaching goals are mainly focused on the mastery of sports skills, demonstration, organization, error correction and evaluation constitute the main content of teachers' work; when physical education courses further undertake the functions of scientific exercise and healthy behavior cultivation, teachers also need to understand students' physical fitness differences and exercise needs, explain the basic relationship between exercise behavior and health, and help students transfer what they have learned in class to extracurricular and daily life. Health promotion and motor skill teaching are not an alternative relationship. Motor skills are important learning contents of physical education courses; the formation of students' sports ability, continuous participation in sports activities and even the cultivation of healthy lifestyles are all based on it. The improvement of health education literacy of college physical education teachers empowered by digital intelligence, in practice, is a balance: while not weakening the disciplinary professionalism of motor skill teaching, it more fully realizes the value of health education.

3.2. Reconstruction of professional knowledge: integration of physical education knowledge and health knowledge

Once the education goals are expanded, the requirements for teachers' knowledge integration will increase accordingly. The professional foundation of college physical education teachers is still composed of knowledge such as motor skills, physical education teaching, sports training and competition rules; while student health promotion involves another type of problems such as physical fitness level, physical activity, exercise load, exercise safety and healthy behaviors. If all kinds of knowledge are separated from each other, even if teachers master multiple kinds of knowledge, they may not be able to make reasonable judgments when facing specific students. Therefore, the focus of knowledge reconstruction lies in the ability of association and transformation, rather than the increment of medical knowledge. Teachers being able to conduct physical fitness tests does not mean that they can explain what the test results mean for physical education teaching and exercise guidance; being able to arrange training does not mean that they can explain what exercise principles are appropriate combined with college students' respective exercise foundations. This demand is even more urgent under the condition of digital-intelligence technology. Data such as physical fitness indicators, exercise load and classroom activity volume will not generate educational significance by themselves; whether their interpretation is valid still depends on physical education and health knowledge. The key to digital-intelligence empowerment is not the mechanical accumulation of "physical education knowledge + health knowledge + digital technology", but to make different kinds of knowledge associated in the same teaching task around students' real exercise and health problems.

¹ Ministry of Education of the People's Republic of China, National Development and Reform Commission, & Ministry of Finance. (2025, November 7). Opinions of five departments including the Ministry of Education on implementing the student physical fitness strengthening plan. Retrieved September 21, 2026, from http://www.moe.gov.cn/srcsite/A17/moe_938/s3273/202511/t20251119_1420840.html

3.3. Transformation of teaching judgment: collaboration of professional experience and data evidence

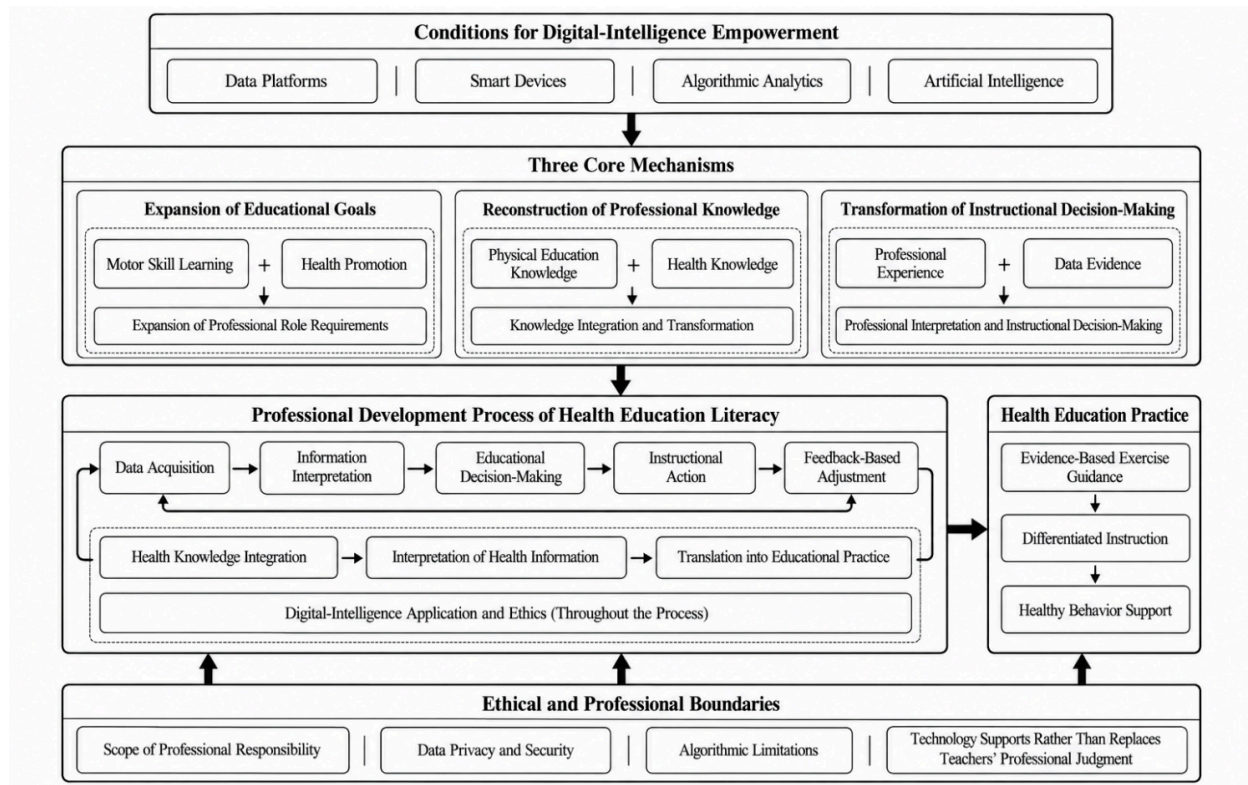


Figure 1. Mechanism of digital-intelligence empowerment for enhancing health education literacy among college physical education teachers

The classroom observation and professional experience of college physical education teachers, accumulated over a long period of time, still have their irreplaceable value; however, students have different physical fitness foundations, sports experiences and learning needs, and the coverage is limited after all only by immediate observation. After digital technology enters college physical education teaching, students' exercise process and physical fitness information can be included in teachers' observation scope more continuously and intuitively, and differentiated teaching thus obtains new information support [12]. The value of data to teaching lies not in the increase of the number of indicators, but in whether the quality of teaching judgment can be improved. Information such as physical fitness test results, heart rate and exercise volume, if limited to score registration and result display, its function is generally limited to recording and management. Only through teachers' professional interpretation can data be transformed into the basis for exercise load adjustment, teaching task design and scientific exercise guidance. Therefore, the collaboration between professional experience and data evidence has become an important implementation way of digital-intelligence-empowered physical education teaching. Data broadens the information sources for teachers to understand students, professional knowledge undertakes the interpretation of data, and specific teaching situations determine how this information is used. The superposition of changes in education goals, knowledge structure and teaching judgment methods constitutes the basic logic for improving the health education literacy of college physical education teachers. Overall, the improvement of health education literacy among college physical education teachers in a digital-intelligence-enabled context involves three interrelated changes: the expansion of educational goals, the

integration of professional knowledge, and the transformation of instructional judgment. Together, these changes facilitate the conversion of physical education and health information into educational practice, as shown in Figure 1.

4. Realistic examination of digital-intelligence empowerment for improving health education literacy of college physical education teachers

At present, there are still few large-scale empirical studies targeting the health education literacy of college physical education teachers. Most health education studies take the whole physical education teachers, teacher training systems or the context of physical education and health courses as objects [3, 4], which cannot be directly equivalent to the actual situation of college physical education teachers nationwide. Meanwhile, existing studies on digital literacy of college physical education teachers have revealed the subject, resource and institutional constraints faced by teachers' digital professional development from the aspects of internal logic, realistic dilemmas and development paths [5, 13]. Therefore, this part does not make a national judgment on the overall level of health education literacy of college physical education teachers, but analyzes the possible adaptation tension between new professional requirements and existing development conditions combined with existing studies on physical education teachers' health education and surveys on digital literacy of college physical education teachers.

4.1. Health education role has not been fully embedded in physical education teaching

The traditional professional role of physical education teachers mainly revolves around physical education courses, sports skills, classroom organization and physical exercise, and health education is easily understood as knowledge supplement outside the curriculum. Existing studies on the professional development of physical education teachers point out that the professional ability of physical education teachers in the new era is further extending from single teaching skills to comprehensive education ability [10]; health education studies also emphasize the importance of physical education teachers' health communication and health education teaching ability [4]. Although these studies cannot directly represent the overall status of college teachers, they suggest that the professional role of physical education teachers needs to more fully respond to the requirements of health education. For college physical education, the key to the problem is not to additionally set up an independent "health teacher" identity, but whether health promotion can truly enter physical education classrooms and exercise guidance. If special teaching, physical fitness tests and health education are separated from each other, the health education value of physical education courses will be difficult to achieve stably; if all student health problems are included in the responsibilities of physical education teachers, it will cause the expansion of professional boundaries. Therefore, how to reasonably embed health education responsibilities in the professional standard of physical education teachers is the first role adaptation problem to be solved.

4.2. Teaching connection between physical education and health knowledge still needs to be strengthened

Health education requires teachers to understand issues such as physical fitness, physical activity, exercise load, exercise safety and healthy behaviors on the basis of physical education professional knowledge. Existing studies on physical education teachers' health education point out that there is still room for further improvement in health education curriculum setting and practical training [3], and the teaching literacy of physical education teachers' health education is also listed as an area that needs to be strengthened [4]. These

studies reflect that the professional development of physical education teachers cannot only focus on special teaching ability, but also needs to strengthen the connection between physical education knowledge and health education knowledge. For college physical education teachers, what is more worthy of attention is not whether they "know health knowledge", but whether they can apply different kinds of knowledge to specific teaching problems. For example, being able to conduct endurance tests does not mean being able to form appropriate exercise explanations based on the test results; understanding the principles of sports training is not the same as being able to transform them into exercise suggestions that are easy for ordinary college students to understand and implement. Digital-intelligence technology increases the information available to teachers, and also raises the requirements for cross-domain knowledge connection and professional interpretation.

4.3. Digital ability has a foundation, but educational transformation of health data still needs to be deepened

Compared with health education literacy, there is certain direct survey evidence for digital literacy of college physical education teachers. A survey of 509 college physical education teachers in Henan Province by Song Bin and Liu Shuang shows that the sample teachers have a generally good performance in digital literacy, among which the score of digital social responsibility is relatively high, while the two dimensions of digital technology knowledge and skills, and digital application are relatively weak [14]. A further survey of 218 physical education teachers from 12 colleges and universities in Henan Province by Huang Lixing et al. found that there are differences in digital literacy performance among teachers with different teaching ages and different course types [15]. Since both studies are regional samples, their conclusions cannot be directly extrapolated to the whole country, but they at least indicate that the digital ability of college physical education teachers is not simply "yes" or "no", but has dimensional and group differences. The above surveys mainly investigate general digital literacy, and this paper further focuses on whether digital information can be transformed into health education practice. In physical education teaching, teachers being able to obtain physical fitness test results, classroom exercise load or physical activity data does not mean that health education has been completed. The real difficulty lies in: whether teachers can judge what the data can explain and what it cannot; whether they can identify meaningful differences combined with students' actual situations; whether they can further transform the judgment into exercise guidance and healthy behavior suggestions. Therefore, the problems faced by the improvement of health education literacy of college physical education teachers empowered by digital intelligence should not be generally summarized as "insufficient digital technology operation ability". What needs more attention is how to establish a professional transformation mechanism from data acquisition to educational action on the basis of existing digital ability. Only through information interpretation, educational decision-making and teaching feedback can physical education and health data truly form health education value.

4.4. Training support needs to shift from general digital skills to professional scenarios

Health education literacy is ultimately reflected in teachers' individual practice, but its formation cannot completely rely on teachers' independent learning. Existing studies on digital literacy of physical education teachers emphasize the importance of teacher training and professional support from the perspectives of layered cultivation, professional scenario application and bridging the digital divide [16, 17]. Combined with the group differences presented in the aforementioned college teacher surveys [14, 15], the professional development of college physical education teachers needs to provide differentiated support based on teachers' existing digital foundation, course types and actual teaching tasks, rather than adopting a single tool training mode. On the other hand, health education itself has interdisciplinary attributes. If health education training

only talks about health knowledge, digital training only talks about platform operation, and physical education teaching and research mainly focuses on special technologies, teachers still need to complete the connection among the three types of knowledge and abilities by themselves. Student health problems may also involve medicine, psychology, nutrition and other fields, and it is difficult to form complete support only by individual learning of physical education teachers.

Overall, the above four aspects are not independent of each other. Professional roles determine whether health education can enter physical education teaching, knowledge integration determines whether teachers can make reasonable interpretations of health information, data transformation determines whether professional judgment can form actual teaching actions, and organizational support affects whether the first three can develop sustainably. This relationship also constitutes the basic basis for the design of practical paths.

5. Practical paths of digital-intelligence empowerment for improving health education literacy of college physical education teachers

The improvement of health education literacy of college physical education teachers cannot be understood as several parallel remedial measures, but should form a coherent professional development process: role cognition solves the problem of "whether health education can enter physical education teaching", knowledge integration solves the problem of "what teachers rely on to make reasonable judgments", data transformation solves the problem of "how to implement judgment into teaching actions", and organizational support solves the problem of "how the above abilities can develop sustainably". Accordingly, a progressive path of "role guidance – knowledge support – ability transformation – ecological guarantee" can be formed.

5.1. Strengthening teachers' professional role cognition of physical education with health promotion

The improvement of health education literacy first needs to clarify the professional position of physical education teachers in student health promotion. College physical education teachers should still take sports teaching and physical practice as their basic duties, but scientific exercise, physical fitness improvement and healthy behavior cultivation need to be more fully integrated into curriculum design and exercise guidance. Specifically, in addition to focusing on movement skills, special teaching should also help students understand the basic health value, appropriate load and independent exercise methods of sports events; in addition to completing tests and result recording, physical fitness tests can also provide appropriate physical education explanations to help students understand their own sports ability characteristics. Thus, health education does not need to add a lot of independent content additionally, but can be embedded in the existing sports teaching and physical fitness evaluation process. At the same time, the responsibility boundary of physical education teachers' health education should be clarified through teaching and research activities. Problems directly related to exercise and physical training are provided with education and guidance by physical education teachers, while professional matters involving disease diagnosis and psychotherapy enter the corresponding service system. Only by clarifying both responsibilities and boundaries can the health education role be practically operable.

5.2. Promoting the integration of physical education and health knowledge with real teaching problems

Only with corresponding knowledge support can role cognition be transformed into effective teaching. College physical education teachers should continue to take professional knowledge such as motor skills, physical education teaching, exercise physiology and physical fitness evaluation as the foundation, and at the same time strengthen the connection with knowledge of physical activity, exercise load, exercise safety and healthy behaviors. Compared with continuously increasing knowledge according to subject classification, it is more appropriate to organize professional learning around real physical education teaching problems. For example, taking problems such as "how to explain endurance test results", "how to adjust exercise load based on students' foundation" and "how to help students who lack exercise for a long time gradually establish exercise behavior" as carriers, guide teachers to comprehensively apply knowledge of exercise physiology, physical fitness evaluation, scientific fitness and health education. Colleges and universities can also use professional resources such as medicine, public health, psychology and nutrition to provide special training, case consultation and referral support for physical education teachers. The purpose of interdisciplinary collaboration is not to expand the professional boundary of physical education teachers, but to improve their basic identification, reasonable interpretation and standardized referral ability in physical education teaching situations.

5.3. Connecting health information and teaching actions through data translation

After the formation of roles and knowledge foundations, whether digital-intelligence empowerment can be truly transformed into health education effectiveness depends on whether physical education and health data can enter teaching actions through teachers' professional judgment. Combined with digital evaluation and physical fitness monitoring – intervention requirements², the digital-intelligence health education ability of college physical education teachers can be summarized as five consecutive links: "data acquisition – information interpretation – educational decision-making – teaching intervention – feedback adjustment". First, data acquisition serves teaching problems. Teachers should determine what kind of information is needed according to teaching goals, rather than pursuing the quantity of data. Data such as physical fitness tests, exercise load and classroom activity volume only have value for further analysis when they are connected with specific teaching problems. Second, information interpretation clarifies the meaning of data. Teachers should judge what the indicators can explain and what they cannot combined with students' physical fitness foundation, sports experience and specific situations, and avoid simple classification and labeled evaluation based on single data. Third, educational decisions form targeted choices. Teachers adjust teaching content, exercise load and guidance methods according to meaningful differences. The "precision" here is mainly reflected in classification, stratification and targeted support, rather than relying on algorithms to mechanically generate independent plans for each student. Fourth, teaching interventions complete educational transformation. Teachers need to transform professional judgments into suggestions that students can understand and implement. Instead of just telling students that "a certain indicator is low", it is more important to explain its relationship with sports ability, what exercises can be chosen and what basic exercise principles should be followed. Fifth, feedback adjustment forms a continuous cycle. Through phased tests, classroom observation and students' exercise feedback, teachers judge whether the existing guidance is appropriate, and

² See note 1 above.

adjust subsequent teaching accordingly, so that health education is transformed from one-time result feedback to a continuous process.

The focus of this capability chain is not technical operation, but information translation. Digital technology broadens information sources, teachers' professional knowledge is responsible for interpreting information, and teaching decisions ultimately need to return to students' real exercise situations. At the same time, the principles of necessary data use, privacy protection and standardized display should be followed, and artificial intelligence and algorithm outputs should be treated prudently, so as to avoid directly equating technical results with educational conclusions.

5.4. Guaranteeing sustainable development of professional ability with organizational support

Health education literacy ultimately needs to be reflected through teachers' individual practice, but its continuous formation depends on school organizational support. The Ministry of Education's Digitalization Empowerment for Teacher Development Initiative has incorporated teacher digital literacy training and organizational guarantee into the teacher development system, and the construction of healthy schools also emphasizes the main responsibility of schools and multi-departmental collaboration. Colleges and universities can integrate teacher training, school-based teaching and research, interdisciplinary collaboration and evaluation support accordingly. First, training should reduce general platform operation and turn to professional scenarios of physical education teaching. For teachers with relatively weak digital technology foundation, basic application support can be strengthened; for teachers who already have certain technical ability, more training should be given to physical fitness data interpretation, exercise load judgment and teaching transformation ability. The differences in teaching age and course types presented in existing regional surveys [14, 15] also indicate that differentiated training is more in line with teachers' reality than unified training. Second, the continuous advantage of school-based teaching and research should be fully utilized. Establish mechanisms of case discussion, classroom observation, data interpretation and teaching reflection around physical health, exercise guidance and digital-intelligence teaching, so that teachers can form professional experience in "design – practice – feedback – improvement". Third, a collaboration and referral mechanism between physical education teaching departments and school hospitals, mental health institutions and related professional colleges should be established. Physical education teachers are responsible for problems within the scope of exercise and health education, and matters beyond the professional boundary are promptly taken over by corresponding professionals. Fourth, teacher evaluation can moderately reflect health education and digital-intelligence teaching practice, and give professional recognition to practices such as scientific exercise guidance, rational use of physical fitness data, and development of health education resources, but it is not appropriate to set up complicated assessment indicators additionally. Resource construction should also adhere to the teaching demand orientation, so that technology reduces the cost of health education practice, rather than forming a new burden of use.

6. Conclusion

The improvement of health education literacy of college physical education teachers empowered by digital intelligence is not simply adding digital tools, health knowledge and digital skills, but re-coordinating teachers' professional roles, knowledge relationships and teaching judgment methods under the background of expanding the goal of health education in colleges and universities. Based on the process of health education tasks, this paper analyzes the health education literacy of college physical education teachers from four dimensions: health knowledge integration, health information interpretation, health education transformation,

and digital-intelligence application and ethics. It should be emphasized that these four dimensions belong to the theoretical analysis framework, and their internal relations and applicability still need to be further tested by follow-up empirical studies. Compared with general discussions on digital literacy, what is more worthy of attention in the improvement of health education literacy of college physical education teachers empowered by digital intelligence is how to transform the increasing physical education and health information into educational actions. The proposal of the capability chain of "data acquisition, information interpretation, educational decision-making, teaching intervention, feedback adjustment" aims to connect technology use, teachers' professional judgment and students' healthy behavior guidance. In the future, verification can be carried out on relevant analytical dimensions and their influencing factors through questionnaire surveys, interviews, classroom observations or case studies of college physical education teachers, so as to promote the research on health education literacy of college physical education teachers from theoretical analysis to empirical testing.

References

- [1] Dong, Q., & Liu, Y. (2024). Educational digitalization empowering the development of school physical education: History, current situation and future. *China Sport Science*, 44(8), 50–60.
- [2] Ma, Y. H., & Mu, J. W. (2025). Digitalization empowering the professional development of physical education teachers: Triple logic, implementation mechanism and path orientation. *Journal of Guangzhou Sport University*, 45(2), 43–52.
- [3] Lü, K., Wang, R. R., & Shen, B. (2025). International reference and Chinese path of cultivating health education literacy of physical education teachers. *China Sport Science*, 45(4), 78–88, 97.
- [4] Yin, Z. H., Liu, H. H., & Sun, M. Z. (2025). Problem diagnosis, era requirements and development strategies of core health education literacy of physical education teachers. *Journal of Guangzhou Sport University*, 45(2), 32–42.
- [5] Fang, Q. H., & Zhang, Y. (2024). Value implication, practical challenges and improvement paths of digital literacy of college physical education major teachers in the digital age. *Journal of Xi'an Physical Education University*, 41(5), 583–591.
- [6] Nutbeam, D. (2000). Health literacy as a public health goal: A challenge for contemporary health education and communication strategies into the 21st century. *Health Promotion International*, 15(3), 259–267.
- [7] Sørensen, K., Van den Broucke, S., Fullam, J., Doyle, G., Pelikan, J., Slonska, Z., ... HLS-EU Consortium Health Literacy Project European. (2012). Health literacy and public health: A systematic review and integration of definitions and models. *BMC Public Health*, 12(1), Article 80.
- [8] Wu, D., Gui, X. J., & Zhou, C. (2023). Teacher digital literacy: Connotation, standards and evaluation. *e-Education Research*, 44(8), 108–114, 128.
- [9] Cao, L., & Ge, X. (2022). Path of integrating health education into school physical education in China from the perspective of "sports-medicine" integration. *Journal of Physical Education*, 29(4), 126–130.
- [10] Duan, R., Ma, L. Z., & Wang, S. T. (2024). High-quality professional development of physical education teachers: Era characteristics, problem domains and footholds. *Journal of Physical Education*, 31(2), 74–81.
- [11] Xu, W. X. (2025). Development and validation of digital literacy scale for primary and secondary school physical education teachers under the background of educational digitalization. *Journal of Physical Education*, 32(6), 102–111.
- [12] Wang, Y. S. (2024). Value implication and implementation path of digitalization empowering college physical education teaching. *Theory and Practice of Education*, 44(21), 57–60.
- [13] Zeng, F. P., & Zhang, P. (2025). Internal logic, realistic dilemma and development path of digital-intelligence empowerment for digital literacy of college physical education teachers. *Journal of Nanjing Sport Institute*,

24(9), 52–57.

- [14] Song, B., & Liu, S. (2024). Research on the improvement path of digital literacy of college physical education teachers under the background of educational digitalization—An empirical analysis based on the digital literacy survey of 509 physical education teachers in Henan Province. *Journal of Anyang Normal University*, 26(2), 118–123.
- [15] Huang, L. X., Feng, W. J., & Rao, Y. (2025). Investigation on the current situation of digital literacy of college physical education teachers in Henan Province and research on improvement paths. *Contemporary Sports Technology*, 15(5), 130–134.
- [16] Yin, Z. H., Jiang, J. J., & Liu, H. H. (2025). Research on high-quality cultivation path of digital literacy of physical education teachers. *Journal of Tianjin University of Sport*, 40(5), 497–505.
- [17] Li, S. J., Li, W., & Yang, T. (2024). Bridging the digital divide: Composition and improvement of digital literacy of primary and secondary school physical education teachers. *Education Research Monthly*, (12), 85–93.