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An exploration of the impact of a health promotion teaching model based on artificial intelligence technology on the physical fitness of physical education students

Xiaoni Zhang[1], Yong Cai[2,✉], Yunwei Li[1], Xinyi Zhou[1], Feilong Wu[3]

[1] *Department of Physcial Education, Xi'an Aeronautical University, Xi'an, Shaanxi, 710077, China*

[2] *Physical Education, Art, Labor Education Center, Zhejiang Shuren University, Hangzhou, Zhejiang, 310000, China*

[3] *College of Sports Science, Shenyang Normal University, Shenyang, Liaoning, 110000, China*

ABSTRACT

Along with the vigorous development of artificial intelligence in all walks of life, artificial intelligence technology has become an inevitable trend in the reform and development of physical education. First of all, this study takes constructivist learning, motor skill learning, and blended learning as the theoretical basis, and selects the three major goals of synergy, intelligence, and wholeness as the basis, and preliminarily constructs the theoretical framework of the health-promoting teaching (SCT) model for the professional disciplines of physical education in colleges and universities. Then, using the gray correlation model, the system characteristics behavioral sequence and the related factors behavioral sequence were established, and the similarity and dissimilarity of the development trends of the two sequences of factors indicator sequences were measured to confirm their correlation degree. Finally, through the implementation condition elements and equipment function elements obtained from the gray correlation analysis, the SCT model applicable to physical education courses was designed, and the effect of the application of the SCT model in physical education classes and its impact on the physical fitness of physical education students were explored. It is found that the SCT model is characterized by timely feedback, strong relevance and abundant resources, so the improvement of all the scores of the students in the experimental class is better than that of the control class, and the physical fitness of the students is also improved to a certain extent. It shows that the teaching effect of SCT mode is better than traditional teaching mode, and can be used in general multimedia classroom, which has certain universality and promotion value.

Keywords: artificial intelligence technology, health promotion teaching, gray correlation model, behavioral sequence, physical education major

1. Introduction

With the continuous development and convergence of science and technology, as well as the

✉ Corresponding author.
E-mail address: zjsruty@163.com (Y. Cai).

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continuous development of the economy leads to the continuous innovation of network technology, in this era of multimedia, Internet big data and artificial intelligence coexistence, science and technology has been integrated into the field of education, and has become a big helper in education. In the field of school physical education, the use of artificial intelligence technology to solve the problem of "difficult to carry out health education" is the origin of the construction of "intelligent physical education teaching mode" [1-2].

There are many factors affecting health in life, but sport plays a pivotal role in promoting the physical well-being of people, and the fitness and cardiovascular function of sport is widely recognized [3-4]. Health education and health promotion is the most favorable means of preventing and treating diseases caused by poor behavior and lifestyle, and is an effective measure to improve the quality of the whole population and reduce the cost of medical treatment [5-7]. Health education is a series of activities and its process of dissemination, education, behavioral intervention to help them make healthful decisions and develop healthy behaviors [8-9]. Health promotion is a working strategy and a mode of thinking in which the government takes the lead and health personnel are the main technical force, as well as society and researchers accept the work of health system personnel to maintain public health [10-11]. Health promotion is not to avoid the risks of physical education classes without safety accidents, but to really promote the improvement of students' physical health. In the predevelopment process, due to ideological bias, physical education teaching in colleges and universities pays more attention to the mastery of sports skills and neglects the cultivation of students' interest, attitude and consciousness, resulting in the decline of students' physical health level year by year and the emergence of psychological problems [12-15]. In the new period, college physical education teaching work must keep pace with the times, start from the foundation, and effectively improve students' physical fitness and health level [16-19]. Therefore, the teaching of public sports in colleges and universities and the concept of health promotion are coincident, complementary, and constantly integrated and developed.

Based on the theories of constructivist learning, motor skill learning, blended learning and other theories, this paper combines the teaching characteristics of physical education disciplines to construct a health-promoting teaching (SCT) model for physical education professional disciplines in colleges and universities. In order to improve students' interest in learning sports programs, cultivate students' ability of independent learning and inquiry learning, and optimize the teaching effect. Through the teaching experiment, effectively combining the network teaching with the traditional teaching mode, the two complement each other's strengths and weaknesses, exploring the impact of the SCT mode of physical education on students' learning awareness, attitudes, interest in physical education, students' physical fitness, etc., and exploring new paths and methods for the reform of physical education teaching.

2. Health promotion teaching model based on artificial intelligence technology

Physical education is an important part of college education and plays an important role in the development of students. In order to cultivate students' innovative thinking more effectively, promote the generation of classroom teaching wisdom, and improve the quality of college physical education teaching. Based on artificial intelligence technology, this study constructs a health-promoting teaching (SCT) model for college physical education professional disciplines, and explores the application and impact of the SCT model in physical education teaching.

2.1. Theoretical foundations of the SCT model

2.1.1. Constructivist learning. Constructivist learning theory is described in three aspects: the constructivist view of knowledge, the student view, and the pedagogical view. The constructivist view of knowledge points out that there is no fixed answer to the knowledge people learn and the problems they face. With the continuous progress of society, people's understanding is also deepening and changing, and their understanding of problems will also be different. Learners only according to their own existing experience background, through specific learning activities to truly understand the knowledge and complete the knowledge reconstruction. Otherwise, it can only be regarded as rote memorization, and this kind of learning is not only unfavorable to the construction of students' knowledge, but also increase the burden of learning and reduce students' interest in learning. In the learning process, students need to understand the new knowledge, but also to analyze, test and reasonably criticize the new knowledge, this view of knowledge is a great challenge to the traditional concept of teaching.

The constructivist view of learning requires learners to actively participate in learning and promote the integration of new and old knowledge, and to achieve such a purpose, only to make students interested in learning, in order to effectively promote active learning, and then obtain the meaning of learning [20]. From the above, it can be seen that the constructivist learning theory has an important guiding significance for the construction and implementation of sports professional courses, which can effectively cultivate students' ability to learn independently.

Students can break through the time and space constraints to carry out group collaborative interactive learning, fully internalize the knowledge and skills learned, highlighting the student's main position. Through independent learning and collaborative learning to obtain the understanding of the two effects are very different from the teacher's direct instillation. The former is conducive to the generation of student wisdom and the cultivation of talents with innovative thinking. It can be seen that the theory of constructivism provides an important guiding significance for the construction of intelligent classroom at the theoretical level.

2.1.2. Motor skill acquisition. The formation of motor skills is a process from simple to complex and requires constant practice in order to master the way of movement. Combined with the perspective of exercise physiology, it can be divided into four stages and the four stages are interrelated. Including:

1) Cognitive stage. Learning with clear goal expectations before learning movement skills is better than learning with vague goal expectations.

2) Movement generalization stage. During this period, the learner is unable to see the whole picture and control the details of the movement, and his attention tends to focus only on individual movements, and he fails to form an organically linked movement program due to the rudiments of each individual movement. As a result, the movements look incoherent, often lose sight of the other side of the phenomenon, and the movements are stiff and uncoordinated.

3) Movement differentiation stage. At this stage, the practitioner begins to link the movements learned, but because the movements are not closely integrated. When the movements are changing, a short pause is likely to occur. At this time, the practitioner's degree of tension is reduced, and the visual control is slowly transformed into muscle sensory control, the interaction between movements is reduced, and redundant movements gradually disappear. However, the movements are not yet stable, and when new and different stimuli appear, redundant movements may reappear, or even incorrect movements may occur.

4) Automation stage. The practitioner's nervousness disappears, the redundant movement disappears completely, and he is able to complete the movement automatically and continuously under unconscious control. Teaching according to the guidance of the motor skill learning theory helps students to form a stable movement pattern quickly and improve the quality of movement.

SCT model in the class before the students have a preliminary knowledge of the skills learned, and then through the teacher in the class to explain the students will be able to quickly from the generalization stage over to the linkage of the positioning stage, and finally through the cooperative learning between students, as well as the consolidation of the work in the classroom, and ultimately to achieve the automation of sports movement skills.

2.1.3. Blended learning. Blended learning refers to the organic combination of two different learning modes, thus realizing the integration of teaching concepts. Blended learning includes the mixing of online learning and face-to-face teaching, formal learning and informal learning, and independent learning and teacher-guided learning.

Blended learning belongs to a kind of integrative strategy, using different media in teaching and delivering information to achieve the purpose of obtaining big benefits with small costs. Blended learning can change the learning environment, learning process and learning content to provide the most appropriate help to learners, so that learners can achieve the best learning results. Blended learning combines the advantages of e-learning and traditional classroom teaching, giving full play to the teacher's “dominance” and the students' “subjectivity”.

Under the guidance of blended learning theory, the SCT model requires students to internalize their knowledge through online independent learning before class, guide them offline through teachers during class, supplement their learning by using smart devices to access relevant materials in the online environment, and transmit what they have learned to teachers through the platform through homework after class, as well as exchange and discuss them in class. Ultimately, the purpose of promoting students' physical health is achieved.

2.2. Conceptual implications of the SCT model

The health promotion teaching (SCT) model for college sports professional disciplines, relying on 5G, artificial intelligence, virtual reality, big data and other technologies in the design of the model emphasizes synergy, intelligence, and wholeness, and different characteristics play a role in the different teaching stages and processes of the SCT model as shown in Figure 1. It aims to provide a better teaching situation for physical education majors, continuously improve the health literacy of college students, and standardize the health behavior of college students.

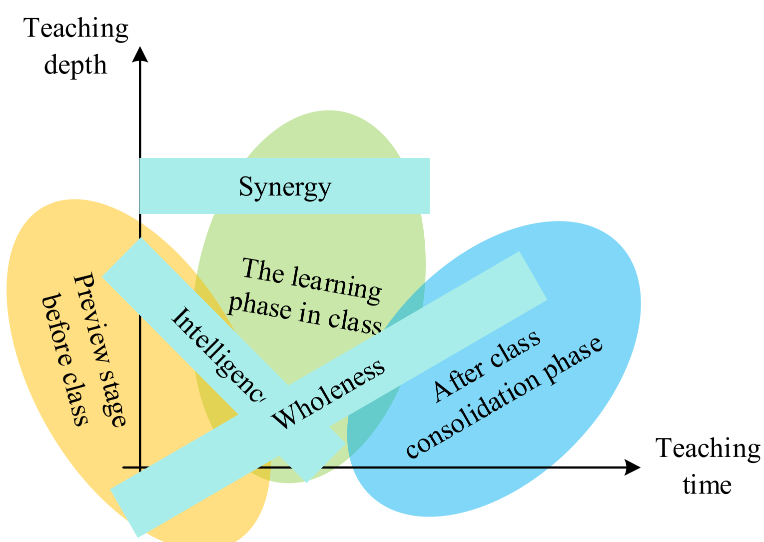

Fig. 1. The influence of the concept connotation of health promotion teaching (SCT) model

1) Collaborative teaching and learning, using intelligent teaching devices to create teaching and learning synergies. With big data, Internet of Things, 5G, artificial intelligence and other technical means are profoundly affecting the process of educational development. At the university education stage, the health promotion teaching (SCT) model for college physical education disciplines also relies on the above technical means to realize the synergistic teaching of health education courses,

and the synergistic relationship between teachers and students is shown in Figure 2. The connotation of synergism in the SCT model contains three aspects:

First, teacher-student synergy between teachers and students, and teacher-student synergy emphasizes the synchronization of information in the teaching process.

Second, student-student synergy between students and students, and student-student synergy emphasizes the autonomy and interaction of learning.

Third, the asynchronous synergy between related courses and health education content, which emphasizes the expansion of health education knowledge and learning reinforcement.

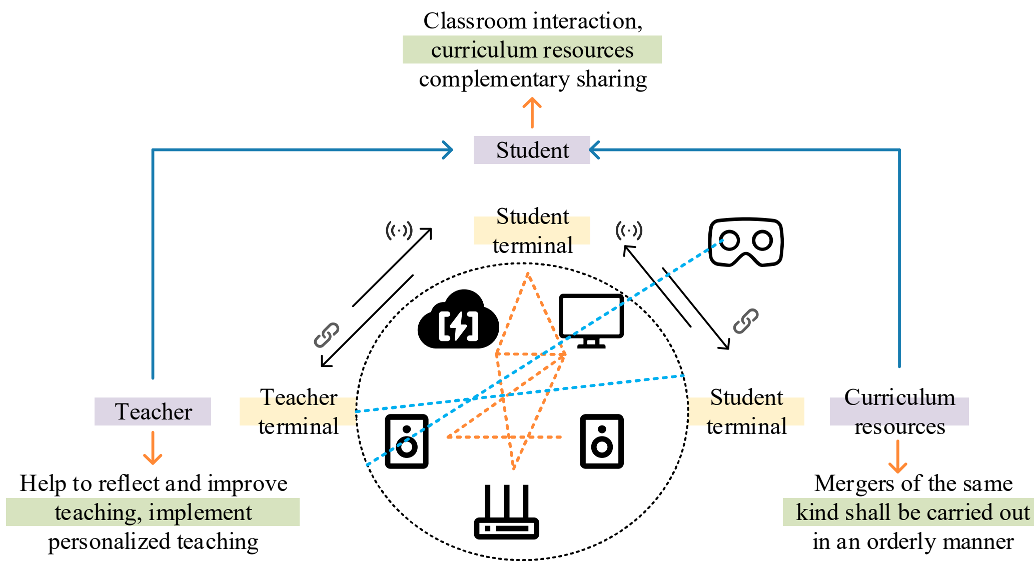

Fig. 2. The cooperative relationship between teachers and students in SCT mode

2) Intelligent teaching, relying on data analysis to provide personalized learning supply. With the continuous development of intelligent information technology, which continues to have an impact on our lives, intelligent information technology has the following characteristics. Mediated, technology has the nature of pointing people to specific objects. Extensibility, technology is in essence an extension of one or more of the human faculties. Learnability, technology is something that can be learned later. Interactivity, the two-way nature of information transfer between media and audience.

The inherent attributes of artificial intelligence technology can provide more possibilities for teaching sessions in physical education. At the same time, artificial intelligence technology can analyze student data to provide personalized teaching path planning, but also can realize the diversity and personalization of multimedia resources, and can monitor the students in the learning process for real-time feedback and assessment.SCT model intelligence concept connotation role as shown in Figure 3, which relies on the use of artificial intelligence technology, SCT model in the process of educational teaching activities With intelligence.

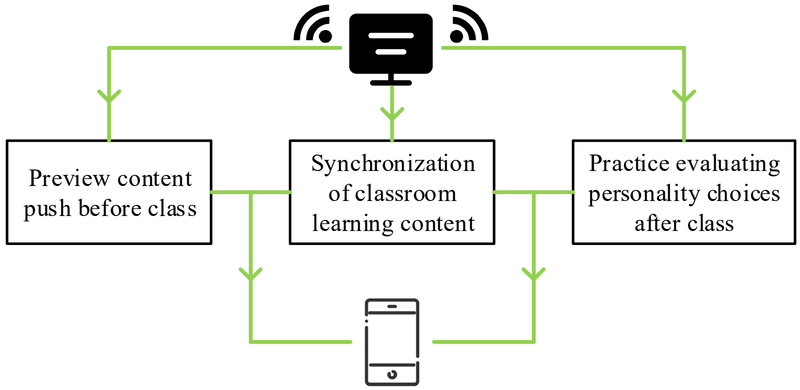

Fig. 3. Connotation of SCT model intelligence concept

3) Holistic teaching, realize teaching consistency with the help of intelligent teaching platform. The traditional three-stage teaching mode consists of pre-study, in-class teaching, and after-class review and consolidation, which is testing for both students and teachers in teaching practice. In the pre-study and post-study consolidation section, students are required to have a high level of independent learning and self-control, and the teaching section involves the teaching of each element of knowledge, which is different for different students with different personalities and different comprehension abilities, so as to ensure that each student can fully understand the various knowledge points in the classroom teaching and master the various elements of knowledge.

One of the important concepts of the SCT model is to realize the coherence of students' learning of health education content, to ensure that throughout the learning process of the entire level stage can be effectively carried out in the pre-study, learning and consolidation, so that students can fully grasp the knowledge and skills necessary for the academic requirements of the stage. Through the participation of the teaching platform to minimize the shortcomings of the traditional three-stage teaching mode, help students to better master the content knowledge of health education, improve students' health literacy.

3. Design elements of the SCT model

3.1. Gray correlation model

Gray correlation analysis is based on the evaluation objectives to establish a sequence of system characteristics behavior and a sequence of related factors behavior. Then, the similarity and dissimilarity of the trends of the two sequences of factors and indicators are measured to confirm the degree of correlation [21]. In other words, correlation analysis is the use of geometric methods to study the relationship between the two factor indicator sequences. The closer the sequence indicator curve is, the higher the correlation between the two, the higher the dependence of the development of the thing on the factor, and the greater the influence of the factor on the development of the thing. System characteristics of behavioral sequences can be the development of optimal (ideal) indicators, can also be the most reflective of the nature of the development of things.

For example, the price of a certain period of time A community as a system characteristic behavior, affecting the fluctuation of the price of the relevant factors there are many behaviors, such as housing orientation, house type design, community positioning, floor area ratio, greening rate, the degree of demand for housing, monetary policy and so on. In order to macro-control of real estate and understand the factors affecting market house prices, the two sequences are analyzed. Gray correlation analysis model is simple to operate, there is no hard and fast requirement for the data and the intrinsic relationship between the factors, and it does not require a large amount of strictly accurate data to complete the study. This method can not only analyze the advantageous factors affecting the development of things by observing the correlation degree of two things, but also make scientific decisions on the development of things.

The calculation steps of gray correlation analysis model are as follows [22]:

1) Determine the evaluation index system according to the purpose of evaluation, collect evaluation data and set m data series to form the following matrix:

$$(X_0, X_1, \dots, X_m) = \begin{bmatrix} X_0(1) & X_1(1) & \cdots & X_m(1) \\ X_0(2) & X_1(2) & \cdots & X_m(2) \\ \vdots & \vdots & \vdots & \vdots \\ X_0(n) & X_1(n) & \cdots & X_m(n) \end{bmatrix} \tag{1}$$

where n is the number of indicators:

$$X_i = (X_i(1), X_i(2), \dots, X_i(n))^T, i = 1, 2, \dots, m \tag{2}$$

2) Determine the reference data series. The optimal value or the worst value in the system indicators can be used to constitute the standard reference series, or the most reference value can be selected according to the evaluation objective, which is recorded as:

$$X_0 = (X_0(1), X_0(2), \dots, X_0(m)) \tag{3}$$

3) The indicator data series are dimensionless (or not) using the correlation operator, and the dimensionless data series form the following matrix:

$$(X'_0, X'_1, \dots, X'_m) = \begin{bmatrix} X'_0(1) & X'_1(1) & \cdots & X'_m(1) \\ X'_0(2) & X'_1(2) & \cdots & X'_m(2) \\ \vdots & \vdots & \vdots & \vdots \\ X'_0(n) & X'_1(n) & \cdots & X'_m(n) \end{bmatrix} \tag{4}$$

Commonly used dimensionless methods include the mean-valued image method and the initial-valued image method:

$$X'i(k) = \frac{X_i(k)}{\frac{1}{n}\sum_{k=1}^{n} X_i(k)} \tag{5}$$

$$X_i(k) = \frac{X_i(k)}{X_i(1)} \tag{6}$$

where $i = 1, 2, .., m$, $k = 1, 2, \dots, n$.

4) Intervalization process to calculate the absolute difference between the indicator series and the reference series:

$$\Delta_i(k) = \begin{cases} \min X'i(k) - X'o(k) & X'o(k) \le \min X'i(k) \\ 0 & \min X'i(k) \le X'o(k) \le \max X'i(k) \\ X'o(k) - \max X'i(k) & X'o(k) \ge \max X'i(k) \end{cases} \tag{7}$$

$$M = \max_{i=1}^{n} \max_{k=1}^{m} | X'_o(k) - X'_i(k) | m = \max_{i=1}^{n} \max_{k=1}^{m} | X'_o(k) - X'_i(k) | \tag{8}$$

5) Calculation of correlation coefficients. Calculate the association coefficient of each comparison sequence with the corresponding element of the reference sequence separately:

$$\gamma(X'_0(k), X'_i(k)) = \frac{m + \xi \cdot M}{\Delta i(k) + \xi \cdot M}, k = 1, 2, \dots, n \tag{9}$$

Where the coefficient of discrimination $\xi \in (0,1)$, then the smaller ξ, the greater the difference between the correlation coefficients, ξ often take 0.5.

6) Calculate the degree of association:

$$\gamma(X_0, X_i) = \frac{1}{n}\sum_{k=1}^{n}\gamma_{0i}(k) \tag{10}$$

7) Based on the correlation sequence of each observation object to derive the comprehensive evaluation results. By comparing the correlation degree between the behavioral sequence of each system feature and the behavioral sequence of related factors, the degree of correlation between the behavioral sequence of each system feature and the behavioral sequence of related factors is derived. The higher the degree of correlation, the greater the degree of influence between the factors.

3.2. Analysis of the importance of SCT model elements

In the process of designing the health promotion teaching (SCT) model for college physical education disciplines, analyzing college students' subjective cognition, implementation conditions, equipment functions, and other needs is a complicated and important basic research. Using the gray correlation analysis method, it is possible to take the data of the behavioral characteristics of the SCT model design needs as the research basis, obtain the order of importance of each element by calculating the gray correlation degree of the relevant elements within the SCT model, and further analyze the advantages of the overall characteristics of constructing the SCT model based on the degree of dispersion of the sequence of the SCT model, and then screen the key elements.

The development process of intelligence has passed through the stages of informatization, digitization, and intelligence, and runs through the stages of network technology development such as collaborative perception of college students' sports and health information, as well as intelligent ubiquity. The SCT model based on artificial intelligence technology is an inevitable product of the development of intelligentization applications to the stage of intelligent ubiquity. The structure of the sample content of the questionnaire survey is basically consistent with the structure of the content of the research hypothesis, and it can be determined that the sample content of this research is representative. This paper adopts simple random non-repeated sampling, which is carried out in the form of network during the period of December 31, 2023 - February 28, 2024, forwarding the questionnaire link to the friends of the students around and spreading it again, which basically represents the attitude of college students of physical education majors in the country to the abovementioned research questions. Since the questionnaire was set up in such a way as to require complete answers to all questions before submission, there were no missing values in the recovered questionnaires.

In the formal research, a total of 4206 questionnaires were recovered, 384 questionnaires were invalidated because the information did not meet the requirements of the research (i.e., the length of time for answering the questionnaires was less than the normal length of time), and 3,822 questionnaires were valid, with an effective recovery rate of 90.87%. In terms of the geographical location of the recovered samples, Shandong, Heilongjiang, Guangdong, Hebei, Jilin, Hunan, Henan, Jiangsu, Shanxi, Shanghai and other places are the main ones. Based on the above findings, the sample data were simulated using SPSS and Amos software to comprehensively analyze the design elements of the SCT model.

3.2.1. Elements of implementation conditions. The subjective cognitive needs of the SCT model of physical education majors are analyzed as task needs, and the implementation condition needs are analyzed as guarantee needs. Based on the analysis and research of the elements of the SCT model, the task needs include a total of seven types of elements, including self-competence (A1), relevance (A2), intrinsicity (A3), integration (A4), identity (A5), self-fulfillment (A6), and self-progress (A7).

Safeguarding needs, including interpersonal drive (B1), facility system drive (B2), information management drive (B3), health promotion drive (B4), etc., totaling four categories of elements.

Based on the gray correlation analysis model, the gray correlation matrix Ψ_1 of task demand A_i and capability demand B_i of the SCT model is obtained as:

$$\Psi_1 = \begin{bmatrix} 0.5332 & 0.5332 & 0.6525 & 0.6637 \\ 0.6261 & 0.6261 & 0.9203 & 0.8834 \\ 0.6433 & 0.6438 & 0.8678 & 0.8347 \\ 0.5034 & 0.5034 & 0.5233 & 0.5343 \\ 0.6534 & 0.6234 & 0.9318 & 0.8918 \\ 0.5059 & 0.5059 & 0.5334 & 0.5381 \\ 0.6164 & 0.6164 & 0.9458 & 0.9224 \end{bmatrix}$$

The calculation gives $\sum_{J=1}^{4}\rho_7 \ge \sum_{J=1}^{4}\rho_5 \ge \sum_{J=1}^{4}\rho_2 \ge \sum_{J=1}^{4}\rho_3 \ge \sum_{J=1}^{4}\rho_1 \ge \sum_{J=1}^{4}\rho_6 \ge \sum_{J=1}^{4}\rho_4$, i.e., 3.1010 ⩾ 3.1004 ⩾ 3.0559 ⩾ 2.9896 ⩾ 2.3826 ⩾ 2.0833 ⩾ 2.0644, which gives $A_7 \ge A_5 \ge A_5 \ge A_3 \ge A_1 \ge A_6 \ge A_4$.

Taking $\mu=0.5$, the absolute value λ_i of A_i is $(\lambda_1,\lambda_2,\lambda_3,\lambda_4,\lambda_5,\lambda_6,\lambda_7)$ = (2.5, 4.5, 3.5, 0.5, 5.5, 1.5, 6.5). It is integrated into the model with the gray correlation matrix of needs to obtain the importance of the conditions for the implementation of the safeguard needs of the SCT model in sports and rank them as shown in Table 1. It can be obtained that among the safeguard needs of the SCT model implementation conditions, the information management drive (B3, 21.1442) is the most dominant, the health promotion drive is the second (B4, 20.5308), and the interpersonal drive (B1, 15.0129) is the second. As a result, in the design of implementation conditions for the operation and management of the SCT model, the focus should be on guaranteeing the intelligent application of the information management drive, effectively driving health promotion and interpersonal communication, and moderately constructing the facilities and system management, so as to comprehensively safeguard the needs of the implementation conditions construction in the construction of the intelligent health promotion teaching model for college students majoring in physical education.

Table 1. SCT mode "Task-assurance" requirement quality

Task requirements	Importance degree	Safeguard demand			
		B1	B2	B3	B4
A1	2.5	0.5332	0.5332	0.6525	0.6637
A2	4.5	0.6261	0.6261	0.9203	0.8834
A3	3.5	0.6433	0.6438	0.8678	0.8347
A4	0.5	0.5034	0.5034	0.5233	0.5343
A5	5.5	0.6534	0.6234	0.9318	0.8918
A6	1.5	0.5059	0.5059	0.5334	0.5381
A7	6.5	0.6164	0.6164	0.9458	0.9224
Importance of guarantee capacity		15.0129	14.8496	21.1442	20.5308
Sort		3	4	1	2

3.2.2. Equipment functional elements. The demand for the implementation conditions of the SCT model for college students majoring in physical education was analyzed as the task demand, and the functional demand for the equipment was analyzed as the guarantee demand. Based on the analysis and research of the elements of the SCT model, the task demand includes four types of elements such as interpersonal communication drive (B1), facility system drive (B2), information management drive (B3), and health promotion drive (B4). Assurance needs include six types of elements such as fitness detection and assessment (C1), fitness goals and prescription (C2), fitness organization and guidance (C3), fitness monitoring and reminder (C4), fitness effect and goal achievement (C5), and promotion of healthy habit formation (C6).

Based on the gray correlation analysis model, the gray correlation matrix Ψ_2 of the task requirements B_i and equipment functional elements C_i of the SCT model is obtained as:

$$\Psi_2 = \begin{bmatrix} 0.5421 & 0.5785 & 0.5627 & 0.5437 & 0.5812 & 0.6882 \\ 0.5421 & 0.5785 & 0.5627 & 0.5436 & 0.5812 & 0.6882 \\ 0.6961 & 0.8672 & 0.7892 & 0.6973 & 0.8834 & 0.7689 \\ 0.7034 & 0.8941 & 0.8137 & 0.7138 & 0.9139 & 0.7643 \end{bmatrix}$$

The calculation gives $\sum_{J=1}^{6} \rho_4 \geq \sum_{J=1}^{6} \rho_3 \geq \sum_{J=1}^{6} \rho_1 \geq \sum_{J=1}^{6} \rho_2$, i.e., 4.8032 ⩾ 4.7021 ⩾ 3.4964 ⩾ 3.4963, which gives $C_4 \geq C_3 \geq C_1 \geq C_2$.

Taking μ=0.5, the absolute value λ_i of A_i is $(\lambda_1, \lambda_2, \lambda_3, \lambda_4)$ = (1.5, 0.5, 3.5, 4.5). Incorporating this into the model with the gray correlation matrix of requirements, the equipment function (C_i) elements of the SCT model for sports majors are obtained and ranked as shown in Table 2. It can be obtained that among the equipment function guarantee needs of the SCT model, fitness effect and goal achievement (C5, 8.3669) is the most dominant, fitness goal and prescription (C2, 8.2157) is the second most dominant, and the promotion of healthy habits (C3, 7.5493) is the second most dominant. Therefore, in the design of the functional elements of the equipment in the SCT model for college students, the focus should be on strengthening the fitness effect and goal achievement, comprehensively setting fitness goals and prescriptions, and effectively designing the health habit formation program, so as to comprehensively guarantee the need for the functional construction of the equipment in the construction of the SCT model for college students majoring in physical education.

Table 2. Sorting result of device function elements in SCT mode

Task requirements	Importance degree	Safeguard demand					
		C1	C2	C3	C4	C5	C6
B1	1.5	0.5421	0.5785	0.5627	0.5437	0.5812	0.6882
B2	0.5	0.5421	0.5785	0.5627	0.5436	0.5812	0.6882
B3	3.5	0.6961	0.8672	0.7892	0.6973	0.8834	0.7689
B4	4.5	0.7034	0.8941	0.8137	0.7138	0.9139	0.7643
Importance of guarantee capacity		6.6859	8.2157	7.5493	6.7400	8.3669	7.5069
Sort		6	2	3	5	1	4

4. Impact of the SCT model on the physical fitness of physical education students

In this study, the Health Promotion Teaching (SCT) model, was applied to the curriculum of the Physical Education major in X College of Physical Education, and three natural classes of the Physical Education major of the class of 2023 were used as the experimental subjects, and the following content was developed as a teaching practice activity in the theoretical class of Basketball.

4.1. Experimental design

1) Purpose of the experiment. Through the implementation condition elements and equipment function elements in the previous section, to design the SCT model applicable to physical education courses, to investigate the effect of the SCT model in the mandatory basketball course, and its effect on the physical fitness of physical education students.
2) Experimental hypotheses. The SCT model can significantly improve the students' performance in sports knowledge, and good sports knowledge can help students construct correct sports representations of sports technical movements, which can better improve students' physical fitness.
3) Experimental control. Before the experiment, three classes of students were tested, and the results showed that there was no significant difference between the classes in terms of theoretical scores, basketball-specific skills, learning interest and students' physical fitness, so that subsequent experimental research could be carried out. They were randomly divided into a control class as well as an experimental class and were taught according to the traditional teaching mode and SCT mode respectively.

For the control class, the traditional teaching mode was applied. In the experimental classes (1) and (2), the SCT mode was used for teaching activities, and the ways and means of teaching activities were different, but the contents and purposes of teaching activities were consistent.

4.2. Experimental results

4.2.1. Comparative Analysis of Learning Interests and Attitudes. In order to analyze the effects of different teaching modes on the learning interests and attitudes of students in each class, electronic questionnaires were distributed, recovered and counted after the experiment.

And after the data were analyzed, the results were obtained as shown in Table 3. It can be seen that the p-value of learning interest of the control class and the experimental class 1 and experimental class 2 after the experiment is 0.006 less than 0.01. In learning attitude, the p-value after the experiment is 0.000 less than 0.01. In the performance of affective cooperation, the p-value after the experiment is 0.002 less than 0.01. In the aspect of health behaviors, the p-value after the experiment is 0.019 less than 0.05. Summing up the results, it suggests that SCT teaching model can significantly affect students' learning interest and attitude.

Table 3. A comparative analysis of students' learning interests and attitudes

	Control Class (n=20)	Experiment 1 Class (n=20)	Experiment 2 Class (n=20)	F	P
Learning interest	40.41±7.31	41.68±7.06	46.13±4.33	5.432	0.006
Learning attitude	38.06±5.77	42.13±6.66	46.34±4.54	10.301	0.000
The expression of affection and cooperation	41.28±5.83	43.95±6.42	47.77±3.61	8.068	0.002
Health behavior	41.84±5.92	45.19±5.50	46.59±5.26	4.882	0.019

In order to further understand which class has better interest and attitude towards learning, the results were obtained after multiple mean comparison as shown in Table 4. In terms of health behavior, the p-value of control class and experimental 1 class after the experiment is 0.015 greater than 0.05, which is significant difference with a mean difference of -3.35. The p-value of 0.006 is less than 0.01 between the control class and the experimental 2 class after the experiment, which is a highly significant difference with a mean difference of -4.75. The p-value of experimental class 1 and experimental class 2 after the experiment was 0.101 greater than 0.05, which is not a significant difference, and the mean difference was -1.4. The analysis of the data shows that the health behavior of the students of experimental class 2 is significantly better than the control class and the health behavior of the students of experimental class 1 is significantly different from the control class. The difference in mean values shows that the health behavior of the students of experimental class 1 is better than the control class.

Table 4 Multiple mean comparison of students' learning interest and attitude

		Control Class vs. Experiment 1 Class	Control Class vs. Experiment 2 Class	Experiment 1 Class vs. Experiment 2 Class
Learning interest	Difference of mean	-1.27	-5.72	-4.45
	P-value	0.043	0.006	0.009
Learning attitude	Difference of mean	-4.07	-8.28	-4.21
	P-value	0.031	0.000	0.031
The expression of affection and cooperation	Difference of mean	-2.67	-6.49	-3.82
	P-value	0.043	0.000	0.022
Health behavior	Difference of mean	-3.35	-4.75	-1.4
	P-value	0.015	0.006	0.101

4.2.2. SCT Model Body Measurement Perception Analysis. Under the SCT model, the correlation analysis of the experimental class students' experiential feelings in the dimensions of overall evaluation (D1), simplicity of participation (D2), ease of use (D3), safety of operation (D4), accuracy of results (D5), and timeliness of feedback (D6) is shown in Table 5. The data results show that the Pearson correlation coefficients of the SCT model between the sub-dimensions of experience perception are all greater than 0.562 ($P < 0.05$), and all of them have a positive and significant relationship.

Table 5. Correlation coefficient matrix table of experience dimension

	Mean	SD	D1	D2	D3	D4	D5	D6
D1	1.414	0.656	1					
D2	1.472	0.678	0.804**	1				
D3	1.456	0.704	0.745**	0.688**	1			
D4	1.301	0.533	0.635**	0.669**	0.645**	1		
D5	1.402	0.681	0.661**	0.562**	0.751**	0.711**	1	
D6	1.321	0.592	0.661**	0.704**	0.633**	0.734**	0.775**	1

In summary, the SCT model demonstrated significant advantages in terms of simplicity of participation. First, the intuitive fitness testing interface and clear operational prompts that students are able to use in the SCT model enable students to get started quickly without complex training or instruction. This design lowers the barrier to use, making it easy for more people to participate in fitness testing. Second, the SCT instructional model utilizes advanced technology, such as sensor technology and algorithmic modeling, in order to automatically and accurately measure and record students' physical data. Students only need to follow the instructions of the device to perform simple movements or operations, and the device will automatically complete the data collection and analysis. This greatly simplifies the process of body measurement and reduces the difficulty for students to participate.

In addition, students can independently utilize smart physical testing devices to conduct physical testing, and this flexibility makes physical testing no longer limited to a specific place or time, further improving the convenience of students' participation in physical testing. Finally, smart physical testing devices can provide real-time feedback and assessment results, so students can immediately understand their physical condition and progress. This immediacy not only enhances the students' experience, but also motivates them to continue to participate in physical testing.

4.2.3. Comparative Analysis of Smart Body Measurement Results. By conducting manual fitness test and then intelligent fitness test for students in SCT mode, the intelligent fitness test scores were obtained in comparison with the manual fitness test scores (invalid data were excluded and the score was 0), and the results of the analysis of the difference between the manual scores and the intelligent scores of different fitness test items are shown in Table 6. In the seven physical fitness test items of standing long jump, 50-meter run, pull-ups, seated body flexion, 800-meter/1000-meter run, BMI, and lung capacity, the scores showed significant differences between the traditional manual method and the intelligent physical test method in the SCT mode, and the intelligent test scores were better.

Table 6. Differences in artificial and intelligent scores for different items

Item		Mean	SD	Paired sample t test	
				t	P
Standing long jump	Artificial score	65.2206	15.3468	14.1013	0.000
	AI score	82.5021	19.7544		
50m race	Artificial score	79.1253	13.5393	16.6072	0.000
	AI score	89.0430	15.1342		
Sit ups	Artificial score	75.8833	17.1359	10.2806	0.000
	AI score	86.2853	14.4172		
Pull-up	Artificial score	60.9241	23.7464	3.0825	0.003
	AI score	77.4325	25.9391		
Sit in a forward bend	Artificial score	73.1984	12.6586	-4.7013	0.001
	AI score	85.2708	14.3754		
800m / 1000m run	Artificial score	77.3319	18.7099	11.064	0.000
	AI score	86.2310	19.9654		
BMI	Artificial score	70.6182	15.1220	8.8151	0.000
	AI score	85.5324	17.9643		
Vital capacity	Artificial score	86.1374	14.2375	-8.1077	0.001
	AI score	91.2077	11.8502		

1) Intelligent testing technology can be optimized by adding humanistic aspects as appropriate to increase students' sense of authenticity and provide more opportunities for communication and interaction.
2) Intelligent testing technology needs to maintain the advantage of simplicity of participation, while improving other aspects of lower student satisfaction, such as data accuracy, and continuous monitoring and evaluation and updating of intelligent technology.
3) Enhancement of technological development and innovation for aspects such as smart technology to test body form and functioning is also desired to achieve positive results in helping teachers and students in testing physical fitness.

This study explored the cognitive attitudes and test results of smart body testing and traditional body testing, and achieved certain results. However, there are still some limitations in the research process, which need to be further deepened and expanded in future research.

First, the survey object as well as the choice of sample can be expanded, as the author only carries out the work related to smart body testing in one school, the subjects of this study are only the first grade students, although the sample has a certain degree of representativeness, the sample can be further expanded, and the use of smart body testing in schools at different levels and in different regions can be analyzed.

Second, the study can explore and analyze the engineers of different groups especially smart body measurement technology to understand the technical deficiencies, but due to the smart technology company its commercial reasons, the interview effect is low.

Thirdly, the dimension of the feeling of using smart body measurement devices and the angle of comparison with the traditional body measurement and the measurement standard exploration needs to be systematic and in-depth.

5. Conclusion

The purpose of this study is how to use artificial intelligence technology and teacher teaching wisdom to effectively improve the quality and efficiency of physical education students and health education content learning, and to promote the overall development of sports skills, physical fitness and health literacy of physical education students. Through text analysis, the status quo and difficulty points of health education content learning are sorted out, and intelligent technology and informatization means are used to intelligentize the learning process and dataize the learning data and resources, so as to design a health-promoting teaching (SCT) model for the disciplines of physical education majors in colleges and universities. In addition, the constructed intelligentized SCT teaching model was subjected to specific teaching practice, and specific investigations were made in terms of students' interest, students' attitudes, intelligent body measurements, learning styles, and learning emotional experiences, so as to validate that the teaching model is effective in promoting students' physical fitness and health.

In conclusion, this study provides useful insights into the application of artificial intelligence technology in health promotion teaching. Future research should continue to expand the scope of the study and explore various issues in depth on the basis of the existing results, with a view to providing more comprehensive and scientific support for the management of college students' physical fitness and health.

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