Teaching Innovation of Core Literacy in Physical Education and Health Courses in Colleges and Universities Based on Multiple Regression Modeling

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Abstract Currently, the teaching of physical education and health courses in colleges and universities only focuses on whether students have completed physical exercise, but not on the cultivation of students' physical education core literacy. This paper establishes a coherent teaching framework of "learning-practice-evaluation" for physical education and health courses from the theory of multiple intelligences and the core literacy elements of physical education, aiming to effectively enhance the core literacy of students in colleges and universities. The study was conducted within the scope of University A in Province G. A questionnaire was used to obtain the data related to students' physical education and health, and a multiple regression model with parameter estimation by the weighted least squares method was used to analyze the role of physical education and health courses in promoting the core literacy of physical education and health. Structural equation modeling was also used to conduct exploratory factor analysis and validation factor analysis of students' physical education core literacy. It was found that for every 1 percentage point increase in the teaching level of physical education and health courses in colleges and universities, the students' physical education core literacy would increase by 1.347 percentage points. The path coefficient between students' factors and physical education discipline factors is 0.853, and the X2/DF of the model is 1.696.Physical education teachers must adopt diversified teaching design under the goal point of core literacy to stimulate students' interest in physical education learning and exercise consciousness, promote students' active participation in physical education activities, and enhance students' core literacy in physical education.

Index Terms weighted least squares, multiple regression modeling, structural equation modeling, physical education and health

I. Introduction

Physical education and health courses are the basic courses in colleges and universities, for this reason, college and university physical education teachers should deeply excavate the ideological and political elements of physical education and health courses [1], consciously assume the educational responsibility of establishing morality and educating people, give full play to the nurturing value of the physical education and health courses, and integrate the cultivation of values, imparting skills, and improving abilities [2], which is an important hand to ensure that ideological and political education in schools is integrated and synergistically developed with physical education teaching It is also a structural intrinsic requirement to comprehensively enhance the soft power of China's sports culture and build a strong sports country [3].

Physical education and health courses in colleges and universities should firmly grasp the requirements of educating people as the foundation and moral education as the first, and carry ideological and political work through the whole process of education and teaching [4], constantly improve the system and mechanism of all-member educating, all-process educating and all-around educating [5], and constantly improve the level of students' ideology, political awareness, and moral quality [6]. Physical education and health courses can well cultivate students' sportsmanship, rule consciousness and so on because of their unique openness, competitiveness and regularity [7].

At present, the integration and innovation of physical education and health courses and moral education in colleges and universities is the key to the forward development of China's education, and at the same time, this reform is a brand new challenge for the current college physical education teachers [8]. Subject to the constraints of the traditional physical education teaching mode, most physical education teachers have not received professional training and guidance on Civic and Political Education, they only have knowledge and skills related to physical education majors, and they fail to have a better grasp of the knowledge structure and theoretical meth-

ods of moral education, so there are some difficulties in the implementation of the task of moral education in the physical education and health courses in colleges and universities [9], [10].

Lifelong learning is the fundamental task of education in the new era, and physical education and health courses in colleges and universities have an important value for the implementation of the task of lifelong learning [11]. Explore and analyze the important role of physical education and health courses in colleges and universities in the implementation of the fundamental task of moral education and the main way to implement the fundamental task of moral education. In the future teaching process of physical education and health courses, teachers should put values guidance in the knowledge transfer, promote the standardization of the same sports knowledge transfer and values guidance, and better implement the fundamental task of moral education in colleges and universities.

Literature [12] tested a conceptual framework using structural equation modeling to understand the role of emotional intelligence and resilience in the development of "perceived importance" by physical education teachers. Literature [13] aimed to identify the social constructivist communication models used by physical education teachers and how these models evolved after participating in a training intervention. Literature [14] explored the quality of physical education instruction and its impact on students' psychomotor learning by combining generic and content-specific practices, concluding that a comprehensive framework for physical education effectiveness can be developed that involves both types of practices. The framework can be used for summative and formative purposes in pre-service or in-service teacher education programs. Literature [15] aimed to provide a systematic review of intervention programs targeting affective learning outcomes in physical education, concluding that offering choices, encouraging peer feedback, asking deductive questions, focusing on individual progress, and differentiating are effective teaching strategies that are widely used to support affective learning in children and adolescents. Literature [16] conducted semi-structured interviews with 19 physical education teachers and school health professionals about best practices in distance physical education. Participants were found to believe that high quality physical education through distance learning was both important and feasible. Literature [17] experimentally showed that stakeholders viewed physical education positively; however, physical educators felt marginalized in the school infrastructure. Literature [18] analyzes the forms of classroom reform and innovation in public physical education and health programs in higher education institutions. By building a healthy physical education curriculum and lifelong exercise ideology, a new physical education goal system centered on good exercise habits is created.

In this paper, the multiple intelligences theory is used as the guiding principle, and the "learning-practice-assessment" consistent teaching framework of physical education and health program is constructed by combining the core literacy

elements of physical education in colleges and universities. The first-year students, teachers and parents of University A in Province G were selected as the research subjects, and a questionnaire was used to collect the data related to the physical education and health curriculum and the development of students' physical education core qualities from the students, teachers and parents. The parameters of the multiple linear regression model were estimated using the weighted least squares method, and the corresponding hypothetical model was established to analyze the role of physical education and health curriculum teaching on the promotion of physical education core literacy and its elements. The method of principal component factor analysis and orthogonal rotation were adopted to extract and conduct exploratory factor analysis of the factors related to physical education core literacy, and structural equation modeling was introduced to model and conduct validation factor analysis of the factors related to the influence of physical education core literacy.

II. Core Qualities of the Physical Education and Health Curriculum

The purpose of teaching physical education and health courses is to improve students' physical education core literacy and enhance their health management. In the current development of student education, schools pay too much attention to the improvement of students' performance and neglect students' health guidance, resulting in the decline of students' physical quality. In the face of such a situation, it is inevitable to need to optimize and improve the educational guidance of students, balancing the learning of students' physical exercise and cultural knowledge, so that students can grow up in a healthy environment, and cultivate students' good exercise habits.

A. Theoretical Framework of Multiple Intelligences

The theory of multiple intelligences, which aims to understand the ways in which different types of cognition and abilities contribute to an independent individual's way of perceiving and understanding the world, demonstrates that human beings are diverse in their ways of thinking and perceiving. Intelligence is an ability to compute information, to process certain types of information, and to derive from human biology and human psychology. The structure of Multiple Intelligences Theory is shown in Figure 1, which mainly includes linguistic, motor, musical, human-computer interaction, introspective, natural, spatial, and mathematical-logical intelligences.

(1) As far as the concept and nature of intelligence are concerned, the intelligences maintain a relatively independent relationship with each other and have little or no influence on each other.

(2) Each person's intelligence structure consists of a variety of intelligences with different degrees of development, which gives the individual a diversified and personalized character. It is precisely because the development of each individual's intelligence is different from each other that makes each person unique.
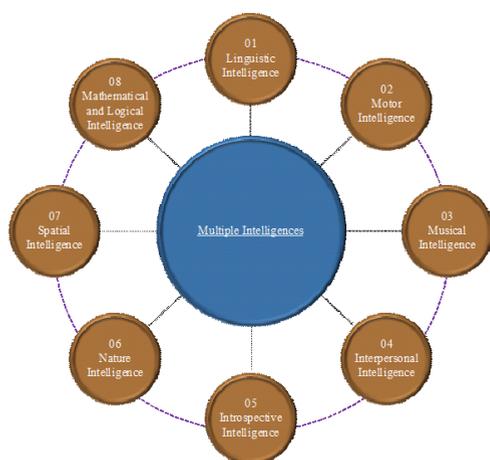
Figure 1: Theory structure of multiple intelligent

Figure 2: Elements of the core accomplishment of sports discipline

(3) All intelligences cooperate with each other and comple-ment each other, which is the basis for the formation of a complete individual intelligence, so there will not be a person completely missing a certain intelligence, at most, the development of intelligence is not sound.

(4) There is no difference between high and low intelli-gence, nor is there any kind of intelligence that is moral or immoral.

B. Elements of Core Literacy in Physical Education

On the basis of the three domains, six elements and eigh-teen points of the Research on Core Literacy for Student Development in the 21st Century, the core literacy of the physical education discipline is the key character and ability formed by students in the process of accepting the physical education curriculum of the corresponding academic period, which is adapted to the needs of lifelong development of the individual and the development of the society. The conceptual elements of core literacy in physical education are shown in Figure 2. Core literacy in physical education is the concrete manifestation of core literacy in physical education, which should include motor skills and habits, health knowledge and behaviors, and physical ethics and emotions.

The objectives of the Physical Education and Health (PE) curriculum are to enhance students' physical fitness, to stim-ulate students' enthusiasm for sports, and to develop healthy abilities, necessary qualities, and optimistic and positive at-titudes towards life for future citizens. Therefore, the core values of Physical Education should be to have good athletic skills, to maintain physical and mental health, and to develop good moral character. In the physical education and health curriculum, core literacy refers to the synthesis of various elements of students' physical education knowledge, emo-tional attitudes, and motor skills. By effectively cultivating students' core literacy, students can benefit for a lifetime in the process of comprehensive development of morality, intel-ligence, physicality, aesthetics and labor. Therefore, physical
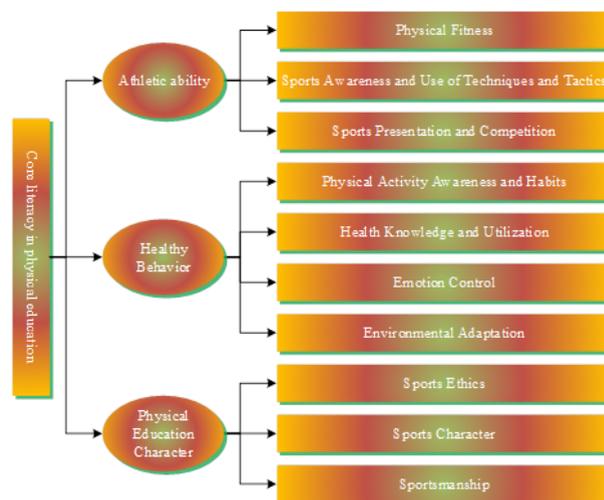
educators to do a good job of teaching curriculum practice, should start from multiple aspects, focusing on exercising students' athletic ability, cultivating students' basic skills, and teachers' own teaching ability and professionalism should be improved simultaneously. Only when teaching and learning grow together, the classroom will proceed more smoothly, and the teaching methods adopted by teachers can be more in line with the basic learning conditions of students.

C. Learning-Practice-Assessment Coherent Teaching Framework

Based on the theory of multiple intelligences, combined with the core literacy elements of physical education and health courses, this paper studies the related problems exist-ing in the core literacy teaching of physical education and health courses, and constructs a consistent teaching frame-work of "learning-practice-evaluation" in physical education and health, as shown in Figure 3. Among them, "learning" refers to learning big concepts, "practice" refers to practicing big tasks, and "evaluation" refers to embedded big evaluation. The consistency of "learning-practice-evaluation" refers to the degree of coordination and matching of the three elements of physical education curriculum teaching objectives, teaching activities and teaching evaluation under the concept of multi-ple intelligences and the goal of core literacy education, which is a systematic thinking on the issues of "why to teach", "what to teach" and "how to teach" in physical education courses.

The teaching framework of "learning-practice-evaluation" consistent content is to coordinate the "point" of teaching, the "line" of teaching, the "surface" of teaching and the "body" of teaching through the teaching design of large units, so as to form a three-dimensional teaching content, and then implement a teaching method of "happy learning, diligent practice, and skillful evaluation". The relationship between "learning-practice-evaluation" is a two-way growth relation-ship, and through continuous adjustment to each other, the
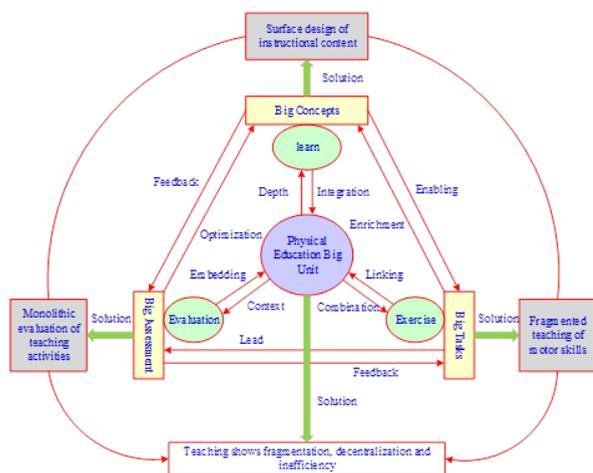
Figure 3: Learning-practice-evaluation consistency teaching framework

Dimension	Content	Code
Teacher factor	Knowledge reserve	A1
	Teaching design ability	A2
	Innovative ability	A3
	Discipline's ability	A4
Student factor	Athletic ability	A5
	Study interest	A6
	Learning mode	A7
School factor	Teaching activity	A8
	Curriculum	A9
	Teaching space	A10
	Education concept	A11
Physical discipline	Teaching characteristics	A12
	Course content	A13
	Curriculum characteristics	A14

Table 1: Factors of core accomplishment

best matching state, that is, consistency, is achieved, so as to complete the fundamental task of improving students' core literacy.

III. Physical Education and Health Core Literacy Research Design

Core literacy is the core of the compulsory education curriculum and curriculum standards, and the new standards for physical education and health curriculum also take the cultivation of core literacy in physical education as the key to curriculum reform, emphasizing the holistic role of students' athletic ability, health behaviors, and physical ethics in solving real and complex problems. In the new era, the teaching of physical education and health curriculum should focus on the integration and holistic cultivation of students' body and mind, develop students' core literacy in physical education through the design of learning and practicing situations, the creation of sports competitions, and so on, and help students use structured physical education knowledge and skills to solve complex problems in real-life situations, so as to promote students to become physically and mentally integrated and comprehensively developed individuals.

A. Study Population and Questionnaire

1) Research Objects and Research Methodology
The extent of the level of core literacy in physical education reached by first-year university students at University A in Province G in the context of the new curriculum and the problems in its development were the objectives of this study. A total of 800 students and 60 physical education teachers were selected as research subjects, and the educational development of the core literacy of physical education and health curriculum in the university itself was further explored through questionnaires. In addition, this paper also used the Questionnaire Star survey platform to distribute questionnaires to students' parents, aiming to clarify parents' understanding of the PE and health curriculum, and to provide support for the analysis of the family's recognition of students' PE and health curriculum.

The research method of this paper mainly chooses questionnaire survey, fieldwork and combing statistical method for analysis. After the questionnaires under the study were recovered, the relevant data obtained were then borrowed on the basis of Excel to be classified and categorized and entered, and combined with the SPSS statistical software to process the entered data, resulting in the tables, pictures and other data needed for the study.

2) Design and Distribution of Questionnaires
It is mainly divided into the design, modification, determination, distribution and recovery of the questionnaire. Through the collation of relevant literature and interview results, as well as the "Curriculum Standard" on the physical education and health curriculum core literacy dimension division as the basis, and with the combination of this paper's research content, the design of the "Student Questionnaire", "Parent Questionnaire", and "Teacher Questionnaire" for the development of core literacy of physical education for students in colleges and universities. Which mainly includes the role of sports core literacy on sports and health courses, sports and health courses core literacy formation of relevant influencing factors. In addition to the basic student, school and family information, the questionnaire is designed for the influencing factors of the core literacy of physical education and health curriculum as shown in Table 1, which mainly includes factors in the dimensions of teachers, students, schools and physical education disciplines.

The questionnaire was filled out in a combination of online and offline methods. The questionnaires were distributed, filled out and returned to the first-year students, physical education teachers and parents of University A in G province. Through the parents-students-teachers (school) to fill in the real name, this detailed survey, a total of 1260 questionnaires were issued, excluding 23 invalid questionnaires, the questionnaire validity rate of 98.17%.

B. Research Modeling

1) Multiple Regression Models

For the specific role of core literacy in physical education and health curriculum on physical education and health curriculum, the mutual influence coefficients between its variables can be effectively analyzed through multiple regression, so as to clarify the importance of core literacy in physical education and health curriculum. Therefore, this paper first addresses the techniques related to the multiple regression model, aiming to provide support for the data analysis later.

1) Linear regression model

Linear regression model studies the relationship between the independent variable and the dependent variable, which is a combination of linear regression models with one or more parameters. A univariate linear regression model contains a dependent variable and an independent variable, also known as a simple linear regression model. A multiple linear regression model contains a dependent variable and multiple independent variables. The expression for a multiple linear regression model is:

$$y = b_0 + b_1 x_1 + b_2 x_2 + \cdots + b_k x_k + \mu, \qquad (1)$$

where $x_1, x_2, \cdots, x_k$ is the non-random independent variable, y is the random dependent variable, b_0 is the constant term, $b_1, b_2, \cdots, b_k$ is the regression coefficient, and μ is the random error term.

If n observations are made for y and x, n sets of observations $y_i, x_{i1}, x_{i2}, \cdots, x_{ik}$ are obtained, which satisfy the following relation, viz:

$$y_i = b_0 + b_1 x_{i1} + b_2 x_{i2} + \cdots + b_k x_{ik} + \mu_i. \qquad (2)$$

Remember:

$$
\begin{cases}
y = \begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_n \end{bmatrix}, \\[2pt]
X = \begin{bmatrix} 1 & x_{11} & \cdots & x_{1k} \\ 1 & x_{12} & \cdots & x_{2k} \\ \vdots & \vdots & \vdots & \vdots \\ 1 & x_{n1} & \cdots & x_{nk} \end{bmatrix}, \\[2pt]
b = \begin{bmatrix} b_0 \\ b_1 \\ \vdots \\ b_k \end{bmatrix}, \\[2pt]
\mu = \begin{bmatrix} \mu_1 \\ \mu_2 \\ \vdots \\ \mu_n \end{bmatrix}.
\end{cases} \qquad (3)
$$

Then model (1) can be written in the following form:

$$y = Xb + \mu, \qquad (4)$$

where y is a $n \times 1$-dimensional observation vector, X is a $n \times (k+1)$-dimensional known design matrix, b is a $(k+1) \times 1$-dimensional vector of unknown parameters, and μ is an $n \times 1$-dimensional vector of random errors.

The assumptions to be satisfied by the classical linear regression model are as follows:

(1) The random error term μ is a random variable whose distribution satisfies $\mu_i \sim N\left(0, \sigma^2\right)$, i.e., μ satisfies the assumption of homoskedasticity.

(2) The different observations between the random error terms are uncorrelated, i.e:

$$E\left(\mu_i \mu_j\right) = 0 \left(i \neq j\right). \qquad (5)$$

Under the condition that the normality assumption is satisfied, the random error terms are independent of each other, and the value taken by the error term in one period is independent of the value taken in any other period.

(3) The explanatory variable x is uncorrelated with the random error term μ, i.e:

$$Cov\left(x_i, \mu_i\right) = 0. \qquad (6)$$

(4) X is a non-random matrix with full rank.

2) Weighted least squares parameter estimation method

For model (1), since there exists $V > 0$ and is known, there exists $V^{\frac{1}{2}} > 0$ such that $V^{\frac{1}{2}} = V$, make the transformation $\tilde{y} = V^{-\frac{1}{2}} y$, where $V^{\frac{1}{2}} = \left(V^{\frac{1}{2}}\right)^{-1}$, then the model becomes:

$$
\begin{cases}
\tilde{y} = V^{-\frac{1}{2}} X\beta + V^{-\frac{1}{2}} e \cong \tilde{X}\beta + \tilde{e}, \\
\tilde{e} \sim N\left(0, \sigma^2 I_n\right).
\end{cases} \qquad (7)
$$

In this way, the least squares method can be used to obtain an estimate of the parameter vector β such that the length squared $\left\| \tilde{y} - \tilde{X}\beta \right\|^2$ of the deviation vector $e = \tilde{y} - \tilde{X}\beta$ is minimized, notation:

$$
\begin{aligned}
Q(\beta) &= \left\| \tilde{y} - \tilde{X}\beta \right\|^2 = \left(\tilde{y} - \tilde{X}\beta\right)' \left(\tilde{y} - \tilde{X}\beta\right), \\
&= \tilde{e}'\tilde{e} = e' V^{-1} e, \\
&= (y - X\beta)' V^{-1} (y - X\beta), \\
&= y' V^{-1} y - 2\beta' X' V^{-1} y + \beta' X' V^{-1} X\beta.
\end{aligned} \qquad (8)
$$

Deriving (8) with respect to β and making it 0 yields:

$$-2X' V^{-1} y + 2X' V^{-1} X\beta = 0. \qquad (9)$$

Reduced to:

$$.X V^{-1} y = X V^{-1} X\beta \qquad (10)$$

Eq. (10) is known as a regular equation, and a sufficient condition for this system of linear equations to have a unique solution is that $X' V^{-1} X$ has rank p and, equivalently, X has

rank p, which is due to $V > 0$. In this paper, it is assumed that this condition is always satisfied. Thus the unique solution of Eq. (10) is obtained. Namely:

$$\hat{\beta} = \left(X'V^{-1}X\right)^{-} X'V^{-1}y. \qquad (11)$$

According to the extremal theory of calculus, $\hat{\beta}$ is just a stationary point of the function $Q(\beta)$. Therefore, it remains to be shown that β does indeed minimize $Q(\beta)$. In fact, for any β, there is:

$$\left\|\tilde{y} - \tilde{X}\beta\right\|^2 = \left\|\tilde{y} - \tilde{X}\beta + \tilde{X}\left(\hat{\beta} - \beta\right)\right\|^2. \qquad (12)$$

Since $\hat{\beta}$ satisfies the regular equation (10), it follows that $\tilde{X}'\left(\tilde{y} - \tilde{X}'\hat{\beta}\right) = 0$, and hence the third term in (12), is 0. This proves that for any β, there is:

$$\left\|\tilde{y} - \tilde{X}\beta\right\|^2 = \left\|\tilde{y} - \tilde{X}\hat{\beta}\right\|^2 + \left(\hat{\beta} - \beta\right)'X'V^{-1}X\left(\hat{\beta} - \beta\right). \qquad (13)$$

Since $X'V^{-1}X$ is a positive definite matrix. Therefore, the second term in (13) is always non-negative. Then:

$$Q(\beta) = \left\|\tilde{y} - \tilde{X}\beta\right\|^2 \geq \left\|\tilde{y} - \tilde{X}\hat{\beta}\right\|^2 = Q\left(\hat{\beta}\right). \qquad (14)$$

The equal sign holds if and only if:

$$\left(\hat{\beta} - \beta\right)'X'V^{-1}X\left(\hat{\beta} - \beta\right) = 0. \qquad (15)$$

Thus, $\hat{\beta} = \left(XV^{-1}X\right)^{-} X'V^{-1}y$ is the weighted least squares estimate of β.

2) Structural Equation Modeling

Structural Equation Modeling (SEM) is a widely used multivariate statistical technique that allows researchers to describe the variables and parameters of interest through statistical models, and then to estimate and analyze them, which is the so-called model definition of SEM. Through model definition, researchers can clarify the relationship between theories and concepts, and complete all assessments and statistical decisions through statistical analysis procedures.

Observed variables and latent variables are the two basic forms in SEM, a structural equation model, which usually consists of two parts, the structural model and the measurement model. The interrelationships between latent variables are represented by the structural model, and the causal relationships between latent variables are discussed through path analysis. The interrelationships between observed variables and potential variables are expressed in a measurement model to come to each other, which can measure the relationship between observed variables and potential variables and constitute a validated factor analysis in the mathematical model.

1) Structural model

In the structural model, the causal relationship between the outer and inner latent variables is solved by a series of linear equations. The expression forms of the outer and inner latent variables are as follows:

$$\eta = B\eta + r\xi + s, \qquad (16)$$

where, $\eta = (\eta_1, \cdots, \eta_p)^T$ denotes the inner latent variable, $\xi = (\xi_1, \cdots, \xi_q)^T$ denotes the outer latent variable, $\varsigma = (\varsigma_1, \cdots, \varsigma_p)^T$, denotes the unexplained residual term of the structural equation model, $B = (\beta_{ij})_{p \times p}$ is the coefficient matrix, reflecting the interaction between the inner latent variables, and $\Gamma = (\gamma_{ij})_{p \times q}$ is the coefficient matrix, the interaction of each outer latent variable on the inner latent variable.

2) Measurement model

The measurement model is the correlation between observed variables and structural variables, which generally contains two forms, namely the relationship between the inner latent variable η and the inner latent observed variable y, and the correlation between the outer latent variable ξ and the outer latent observed variable x. The general expression for the measurement equation is:

$$x = \Lambda_x \xi + \delta, \qquad (17)$$

$$y = \Lambda_y \eta + \varepsilon, \qquad (18)$$

where $x = (x_1, \cdots, x_m)^T$ is the exogenous latent observed variable, $y = (y_1, \cdots, y_n)^T$ is the endogenous observed variable, $\eta = (\eta_1, \cdots, \eta_p)^T$ denotes the endogenous latent variable, and $\xi = (\xi_1, \cdots, \xi_q)^T$ denotes the exogenous latent variable. $\delta = (\delta_1, \cdots, \delta_m)^T$ is the error term for the exogenous observed variable x, $\varepsilon = (\varepsilon_1, \cdots, \varepsilon_n)^T$ is the error term for the external latent observed variable y. $\Lambda_x = (\lambda_{ij})_{m \times q}$ is the factor composite matrix on the exogenous latent observation variable and $\Lambda_y = (\lambda_{ij})_{n \times p}$ is the factor composite matrix on the endogenous latent observation variable.

In path diagrams for structural equation modeling, it is generally specified that circular boxes are used to represent latent variables, rectangular boxes are used to represent observed variables, straight arrows are used to represent hypothesized causal relationships between variables, pointing from the cause variable to the effect variable, and unboxed variables are error terms that are not accounted for by the equations.

IV. Physical Education and Health Core Literacy Empirical Analysis

Practicing the concept of core literacy has become an important trend in teaching reform, physical education and health courses in the new curriculum reform concept of the promotion of their own status, physical education teachers should also do a good job of curriculum reform to raise the level of attention, in line with the principle of combining theory and practice, in the classroom to achieve the purpose of cultivating students' core literacy. Relying on physical education and health courses to help students develop a lifelong awareness of sports, to develop good sports habits, in order to lay a solid foundation for future work and learning and long-term development.

A. Physical Education and Health Program Regression Analysis

Based on the questionnaire designed in the previous section, this paper uses the multiple linear regression model to analyze the data obtained from the questionnaire and establishes the multiple linear regression model as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 Control_i + \varepsilon_i, \qquad (19)$$

where Y is the explanatory variable, which mainly consists of the core physical education literacy as well as the three constituent dimensions of the core literacy, i.e., athletic ability, health behavior and physical integrity. β_0 is the constant term, $\beta_1 \sim \beta_2$ is the regression coefficient of each variable, X_1 is the key explanatory variable Physical Education and Health Classroom Teaching, $Control_i$ is each of the control variables, i.e., nature of the school, gender of the students, age of the father, occupation of the father, age of the mother, occupation of the mother, and gender of the Physical Education Teacher, and ε_i is a random perturbation term.

1) Core Literacy Regression Results

Based on the multiple linear regression model given above, this paper analyzes the influence of physical education and health classroom teaching on physical education core literacy with the data from the questionnaire. Table 2 shows the regression results of core literacy.

From the regression results of the effect of physical education and health classroom teaching on physical education core literacy, the promotion of physical education and health classroom teaching on physical education core literacy is highly significant (Sig. < 0.01), and its regression coefficient is 1.347, reflecting that for every 1 percentage point of improvement in the level of physical education and health classroom teaching, the students' physical education core literacy increases by 1.347 percentage points. It indicates that improving the effectiveness of physical education and health classroom teaching is an important path to promote the development of students' physical education core literacy. The effect of school nature on students' physical education core literacy among other variables is significant (Sig.<0.01) with an impact coefficient of 0.869. It indicates that developing students' physical education core literacy in colleges and universities in economically developed areas is better than in schools in economically backward areas, probably because the conditions and resources of colleges and universities in economically developed areas are better than those of schools in economically backward areas.

2) Combined Factor Regression Results

After clarifying the role of physical education and health classroom teaching on students' physical education core literacy, this paper also analyzes the role of physical education and health classroom on the three elements of physical education core literacy, and Table 3 shows the results of the comprehensive factor analysis.

From the regression results, it can be clearly seen that the effects of physical education and health classroom teaching on motor ability, health behavior and physical integrity are all highly significant (Sig. < 0.01). The effect of nature of school on students' motor ability is significant and the effect on health behavior and physical integrity is not significant. Gender of the physical education teacher has no effect on athletic ability and physical character, but the effect on health behavior is significant and negative with an effect coefficient of -0.368, which shows a negative significant effect at 5% level. That is, students whose physical education teachers are female have better health behaviors, which may be due to the fact that female physical education teachers pay more attention to educating students on health behaviors. Specifically as follows:

(1) The coefficient of influence of physical education and health classroom teaching on students' athletic ability is 0.639 and significant at 1% level, which shows that physical education and health classroom teaching has an important influence on the acquisition of students' athletic ability. Physical education and health classroom teaching should be based on the characteristics of the physical education discipline, and should be targeted to integrate the core literacy education of the physical education discipline. The acquisition of motor ability is a fundamental and practical feature of the physical education and health curriculum, which is one of the main tasks of physical education classroom teaching.

(2) The coefficient of influence of physical education and health classroom teaching on students' health behavior is 0.818, and it shows significant positive influence significantly at 1% level, which shows that physical education and health classroom teaching has an important influence on the development of students' health behavior. Physical education and health classroom is the best time to promote health, cultivate awareness, enhance ability, personality development and emotional education. Physical education and health classroom teaching should be combined with the fundamental characteristics and unique value of school sports, and incorporate the healthy behavior education of physical education core literacy.

(3) The coefficient of influence of physical education and health classroom teaching on students' physical character is 1.648, indicating that every 1% increase in the effect of physical education and health classroom teaching enhances students' physical character level by 1.648%, which shows that physical education and health classroom teaching has an important influence on students' acquisition of physical character. The acquisition of physical education virtues in the core qualities of physical education is an important manifestation of the implementation of the ideology of "making people moral", which is the essence of education. The sports venue is an important treasure for cultivating

Factor	Core accomplishment			
	$\beta\ value$	$Wald\ \chi^2$	$Sig.$	$Exp(\beta)$
Sports and health classroom teaching	1.347	81.256	0.001	4.029
School nature	0.869	8.512	0.000	3.107
Student gender	-0.163	0.437	0.535	2.515
Father's age	0.264	0.819	0.216	0.683
Fatherhood	0.072	0.024	0.573	1.315
Mother's age	0.138	0.306	0.628	1.024
Motherhood	0.067	0.458	0.464	1.073
Gender of sports teachers	0.421	0.605	0.415	1.146
(Constant term)	0.745	0.816	0.314	1.241

Table 2: Regression of core accomplishment

students' interpersonal relationship and teamwork consciousness, and cultivating students' perseverance and courage while participating in sports.

The development of students' physical education core literacy is a long-term process, and the goals and contents of physical education and health classroom teaching should be based on the core literacy of physical education as the "kernel", so that the key abilities beneficial to students' lifelong development can be integrated into the implementation of the physical education and health curriculum. Physical education and health classroom teaching is an important pathway for the development of students' core physical education qualities, and should be combined with a variety of teaching materials to improve and develop students' core physical education qualities, so that students can improve their athletic ability, achieve physical and mental health, form good character qualities and develop into complete human beings.

B. Analysis of Factors Influencing Core Literacy

The analysis of the promotion of physical education and health courses on students' physical education core literacy, and this section combines the structural equation model with the questionnaire data to deeply analyze the specific factors affecting students' physical education core literacy, aiming to help colleges and universities to further optimize the construction of physical education and health curricula, and to fully enhance students' physical education core literacy.

1) Exploratory Factor Analysis

Based on the questionnaire designed in this paper on the influencing factors of sports core literacy, KMO test and Bartlett spherical test are used to determine whether the questionnaire data are suitable for factor factor analysis before proceeding to the exploratory factor analysis step. Generally the value of KMO reaches 0.65 to meet the condition of continuing to do factor analysis, this paper mainly adopts the principal component factor analysis and orthogonal rotated winds, and uses SPSS software to carry out exploratory factor analysis on sports core literacy. After the corresponding operation, it is found that the KMO value of this questionnaire is 0.927, and the result of Bartlett's spherical test is less than 0.01, which is statistically significant, then it indicates that the data of this questionnaire is suitable for factor analysis.

1) Cumulative contribution of factors

Based on the data obtained from the questionnaire, the establishment of the reflective image matrix aptness measure to obtain the common degree of each item, and the use of factor analysis gravel diagram to select a total of four factors with characteristic root greater than 1, then the cumulative contribution rate of each component factor of each item is obtained as shown in Table 4. According to the distribution of the cumulative contribution rate of each factor, it can be seen that the cumulative variance contribution rate of these four factors extracted from the above steps is 83.828% ($\geq$50%), which meets the requirements.

2) Factor rotation

In order to better divide the dimensions as well as better name each factor, we would like to rotate the factors using the orthogonal rotation maximum variation method, get the rotated component matrix, and get the exploratory factor analysis results of each factor as shown in Table 5.

Based on the rotated component matrix, it can be seen that Factor 1 mainly includes knowledge reserve, instructional design ability, innovation ability and subject integration ability, and its factor loading values are 0.861, 0.834, 0.866 and 0.765 respectively, and all four factors are closely linked with teachers. Factor 2 contains motor ability, learning interest, and learning styles, and the factor loading values of its factors are 0.889, 0.756, and 0.753, respectively, and all of them are related to students' performance in physical education and health courses. Factor 3 and Factor 4 were strongly linked to school as well as physical education disciplines, respectively.

2) Validation Factor Analysis

Based on the four types of influencing factors obtained from exploratory factor analysis, the four dimensions of teacher factors, student factors, school factors and physical education subject factors were used as factors, and the structural model and path coefficients of the influencing factors of students' core literacy in physical education were produced by using the AMOS software, and the results are shown in Figure 4.

As can be seen from the figure, there is a direct influence between the four influencing factors of students' core literacy in physical education. The path coefficient between teacher factors and student factors reaches 0.684, the path coefficient between teachers and physical education disciplines is 0.726, and the maximum influence path coefficient between students and physical education disciplines is 0.853.In the teaching

Factor	Athletic ability			
	β value	Wald χ^2	Sig.	$Exp(\beta)$
Sports and health classroom teaching	0.639	51.414	0.000	2.412
School nature	0.328	3.069	0.063	1.513
Student gender	0.206	1.547	0.138	1.306
Father's age	-0.247	6.218	0.027	0.518
Fatherhood	0.054	0.156	0.216	1.034
Mother's age	0.153	1.473	0.403	1.159
Motherhood	0.012	0.058	0.515	1.045
Gender of sports teachers	-0.085	0.097	0.316	0.847
(Constant term)	0.618	0.535	0.024	0.561
-	Health behavior			
Sports and health classroom teaching	0.818	63.516	0.001	2.718
School nature	0.062	0.083	0.513	1.204
Student gender	-0.134	0.529	0.307	0.869
Father's age	-0.167	0.817	0.128	0.832
Fatherhood	-0.121	1.524	0.237	0.916
Mother's age	-0.116	0.768	0.224	0.887
Motherhood	0.084	1.256	0.315	1.124
Gender of sports teachers	-0.368	0.787	0.038	1.306
(Constant term)	0.579	0.449	0.161	1.515
-	Physical character			
Sports and health classroom teaching	1.648	72.134	0.000	4.632
School nature	0.157	0.078	0.176	1.315
Student gender	-0.062	0.035	0.108	0.924
Father's age	0.315	0.518	0.513	1.503
Fatherhood	0.163	1.435	0.429	1.181
Mother's age	0.424	1.243	0.335	1.457
Motherhood	-0.076	0.036	0.274	0.689
Gender of sports teachers	0.518	2.415	0.307	1.525
(Constant term)	0.464	0.407	0.058	0.513

Table 3: The regression of the comprehensive factor

Factor	Initial eigenvalue			Extracting the load of the load		
	Total	Variance/%	Cumulative/%	Total	Variance/%	Cumulative/%
A1	15.634	39.415	39.415	15.634	39.415	39.415
A2	8.571	18.368	57.783	8.571	18.368	57.783
A3	6.149	14.516	72.299	6.149	14.516	72.299
A4	4.767	11.529	83.828	4.767	11.529	83.828
A5	2.124	5.615	89.443			
A6	1.243	2.531	91.974			
A7	0.695	1.347	93.321			
A8	0.513	1.154	94.475			
A9	0.461	1.068	95.543			
A10	0.424	1.021	96.564			
A11	0.398	1.006	97.570			
A12	0.323	0.968	98.538			
A13	0.285	0.815	99.353			
A14	0.226	0.647	100.000			

Table 4: Cumulative contribution of factors

Influencing factor	Variable	Factor load value
Teacher factor	Knowledge reserve	0.866
	Teaching design ability	0.861
	Innovative ability	0.834
	Discipline's ability	0.765
Student factor	Athletic ability	0.889
	Study interest	0.782
	Learning mode	0.753
School factor	Teaching activity	0.886
	Curriculum	0.859
	Teaching space	0.847
	Education concept	0.826
Physical discipline	Teaching characteristics	0.801
	Course content	0.775
	Curriculum characteristics	0.758

Table 5: Analysis of exploratory factors in each dimension

process of physical education and health courses, physical education teachers no longer only teach the content of physical education disciplines, they should break the boundaries between disciplines and integrate other disciplines on the basis of physical education disciplines' teaching Content. Based on physical education, there is a shift from single-subject knowledge learning to multiple-subject knowledge learning, highlighting the value of the physical education and health curriculum in fostering students' core qualities and promoting their all-round development. In the learning process of physical education and health courses, students should combine knowledge of multiple disciplines, and the learning mode should not be rigid, but should organically combine different
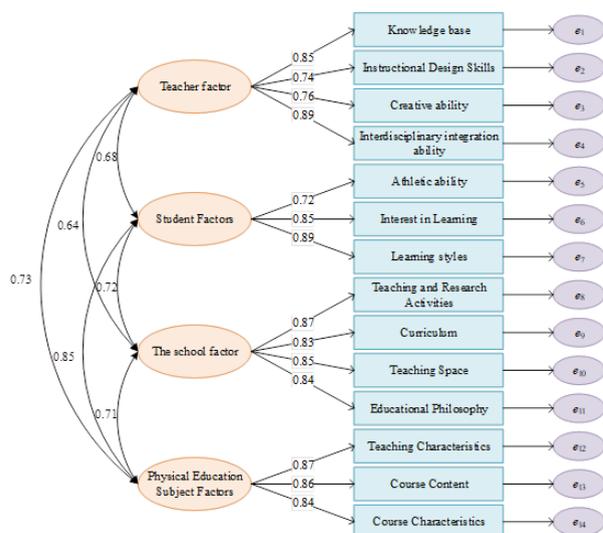
Figure 4: Structural model and path coefficient

learning modes to better adapt to the learning of physical education and health courses, so as to cultivate their own core qualities of physical education. The characteristics of physical education and health courses are closely related to the core qualities of sports, and the prerequisite for creating a high-quality physical education and health curriculum system is to integrate the characteristics of the physical education curriculum and multidisciplinary knowledge into the curriculum, so as to lay a foundation for the cultivation of the core qualities of the students, and their analytical and problem-solving abilities.

AMOS software was used to analyze the sample data, and the fitting indices such as X2/DF, RMSEA, IFI, TLI, CFI and PNFI were selected as the basis for evaluating whether the model is scientific or not, and the key fitting indices of the structural equation model were obtained as shown in Table 6.

X2/DF is a statistic to directly test the similarity between the sample covariance matrix and the estimated covariance matrix, and it is good when the value of X2/DF is between 1 and 2.5, and needs to be corrected if it is greater than 5. As can be seen, the overall X2/DF of the model of students' physical education core literacy influencing factors is 1.696, and this value indicates that the influencing factors have a certain degree of scientific validity. The root mean square error of approximation RMSEA is 0.043, and when the value of RMSEA is less than 0.09, it indicates that the fit of the model meets the reference standard. When IFI, TLI, CFI is greater than 0.85, it indicates that the structural model fit index reaches the standard, and the adjusted PNFI index value is 0.713, which is greater than 0.6. Thus, it indicates that the structural model and path coefficients of the core literacy in students' physical education and health courses established in this paper have good structural validity, which can reflect the specific factors affecting the core literacy in students' physical education and provide support for the optimization of the university's Physical education and health course teaching

methods to provide support.

V. Conclusion

Based on the theory of multiple intelligences and the elements of physical education core literacy, this paper establishes a coherent teaching framework for physical education and health courses, and assembles multiple regression and SEM models to analyze the promotion of physical education and health courses on students' core literacy as well as the influencing factors of students' core literacy.

(1) The promotion coefficient of physical education and health curriculum on students' physical education core literacy is 1.347, which indicates that for every 1% enhancement in the teaching level of physical education and health curriculum, the level of students' physical education core literacy will increase by 1.347%. In addition, the teaching of physical education and health courses will enhance students' athletic ability, health behavior, and physical integrity. Colleges and universities need to pay attention to the design of teaching physical education and health courses, so as to provide assistance in promoting students' physical education core literacy.

(2) For students' core literacy in physical education, it is mainly affected by the four dimensions of teachers, students, schools and physical education disciplines, combined with the structural equation modeling to get the maximum influence path coefficient between students and physical education disciplines is 0.853, and the overall fit of the model is X2/DF is 1.696, which indicates that the factor structure of students' core literacy in physical education is relatively stable, and it can be clearly understood that the core literacy in physical education is influenced by all kinds of factors, and colleges and universities need to optimize the design of physical education and health courses to help promote students' physical education. The various types of influencing factors, colleges and universities in the optimization of physical education and health courses focus on these types of factors, can effectively promote the development of students' physical education core literacy.

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Factor	X2/DF	RMSEA	IFI	TLI	CFI	PNFI
Teacher factor	1.862	0.052	0.966	0.968	0.961	0.682
Student factor	1.734	0.061	0.963	0.971	0.959	0.696
School factor	1.523	0.047	0.972	0.954	0.972	0.675
Physical discipline	1.647	0.058	0.957	0.959	0.965	0.683
Total Model	1.696	0.043	0.969	0.972	0.958	0.713

Table 6: The results of the combined indices

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