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Labor Education-Driven Cultivation of Student Professional Ethics and Synergistic Enhancement of Practical Competencies

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SUMMARY: *Labor education plays a key role in the development of the practical skills and professional qualifications of students and can help shape good citizens as well. This paper employs the structural equation model technique to analyze the existing situation regarding the cultivation of professional ethics and practical skills among students of a specific educational institution. On the basis of empirical data, the structural equation model is built connecting the cultivation of professional ethics with that of practical skills. In the proposed model, the directional relations and specific forms of manifestation depending on geometric thinking are quantified. As a result of empirical studies, it becomes clear that the impact of labor education on the development of the students' professional ethics and practical skills is significant. Therefore, educational institutions need to theoretically understand the importance of labor education, to improve the relevant curriculum and to introduce a greater proportion of practical training with new content and methods. Moreover, it is recommended that labor education be promoted through the creation of labor culture in the campus environment.*

KEYWORDS: *structural equation modeling; labor education; professional ethics; practical skills*

1 Introduction

As society advances, modern society places increasingly higher demands on students. It is not enough for one merely to have theoretical knowledge to cope with the demands of the modern world. Thus, labor education among students becomes an important task. Labor education involves developing professional ethics and skills along with other traits in students by means of practical participation in various activities [1, 2].

To begin with, labor education encourages the growth of professional ethics of the learners. The area entails a number of skills, which include personal morality, professional ethics, and vocational expertise [3, 4]. As a result of labor experiences, students will understand the nature and demands associated with different professions. Learners will build career ethics and values while at the same time improving their professional skills [5-7]. In addition, labor education gives learners the opportunity to develop vocational skills through labor activities, thus enabling them to be better prepared for any future career challenges. This will only happen when learners have high levels of professional competence [8-11].

Secondly, the importance of labor education lies in its critical contribution to the development of practical skills among students. Labor education provides an environment in which practical skills are developed. By engaging in labor practice, students combine the theory

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they learn at school with actual labor, translating theory into practice, thus facilitating better mastery of the acquired knowledge [12-15]. Additionally, student labor education does not confine itself to the college environment alone; it can also benefit from social resources [16, 17]. Colleges could cooperate with companies and other organizations to organize labor education, thus helping students become involved in social practice and learn about different professions [18-20].This type of education would help students develop their professional skills and also connect them with society [21, 22].

The research begins with the establishment of theoretical underpinnings that offer the theoretical framework and strategies required to develop a theoretical model of the correlation between the development of professional ethics of students and the enhancement of their practical skills. The selected school is going to play a role of a case to measure the general level of professional ethics formation within the students in the existing conditions. With this backdrop, SPSS software will be employed to conduct a statistical analysis of survey data, which will encompass three questions: (a) how professional ethics attributes differ across different student demographic characteristics; (b) statistical analysis of each attribute of professional ethics; and (c) assessing the current level of professional ethics formation in schools. Simultaneously, structural equation modeling will be used to determine how labor education may influence professional ethics and practical abilities of students.

2 Study Design

2.1 Research Methods

2.1.1 Questionnaire Survey Method

The researchers used the Questionnaire Star platform to develop a questionnaire that was sent through WeChat and other mobile apps to the students of three universities in Guangdong province. The survey attempted to evaluate the present situation of developing professional ethics and practical skills of student workers in higher education institutions. The gathered information was sorted and processed in order to determine the existing problems. Following the problem-oriented strategy, the research identified the underlying causes of these problems and suggested specific optimization measures.

2.1.2 Structural Equation

Structural Equation Modeling (SEM) is a multivariate statistical technique that combines both factor analysis and path analysis to confirm and examine complicated associations among variables using mathematical models. One of its most important advantages is that it can deal with complex path relationships with more than two variables.

The fundamental difference between SEM and traditional statistical methods lies in their operational principles. While traditional methods operate on specific variables, SEM operates on covariance matrices that describe relationships between variables. Its principle involves testing the similarity between the actual covariance matrix Σ and the sample covariance matrix $\Sigma(\theta)$, aiming to minimize the value of the fitting function $|\Sigma - \Sigma(\theta)|$ [23]. Therefore, SEM is also referred to as the covariance model (CSM). The structure of the structural equation model is illustrated in Figure 1.

(1) Variable Analysis

Variables form the foundation of statistical analysis. Structural equation modeling possesses its own unique variable system, specifically as follows:

① Latent variables:

Latent variables, also known as hidden variables, concepts, or factors, refer to specific variables within a sample that cannot be directly observed. Based on the nature of their influence relationships, latent variables can be categorized into two types: First, exogenous latent variables, which are variables in the model that only affect other variables without being influenced by them. These variables serve solely as explanatory factors in the model and are typically denoted by ξ. The other type is endogenous latent variables, which are influenced by any latent variable within the model. These are typically denoted by η. It is important to note that variables like η_1 in the diagram, which are influenced by other latent variables while also influencing them, are also endogenous latent variables. These can be termed mediating variables, acting as intermediaries between two latent variables.

② Observed Variables

Observed variables, also called manifest variables or measured variables, refer to variables that can be directly observed or measured. They are used to characterize latent variables that cannot be directly observed. Since the model contains two types of latent variables, there are corresponding types of observed variables. Typically, x denotes the observed variable of the exogenous latent variable ξ, while y denotes the observed variable of the endogenous latent variable η.

③ Residual Terms

Residual terms refer to unexplained errors within the model or inherent errors in the variables themselves. Structural equation models primarily involve two types of errors: one is systematic error, which arises from the unexplained portion of endogenous latent variables not accounted for by exogenous variables. This is termed systematic error and is typically denoted by ζ. The second type is measurement error, arising from the process of observing variables. This is termed random error, with ε and δ representing the measurement errors for y and x, respectively.

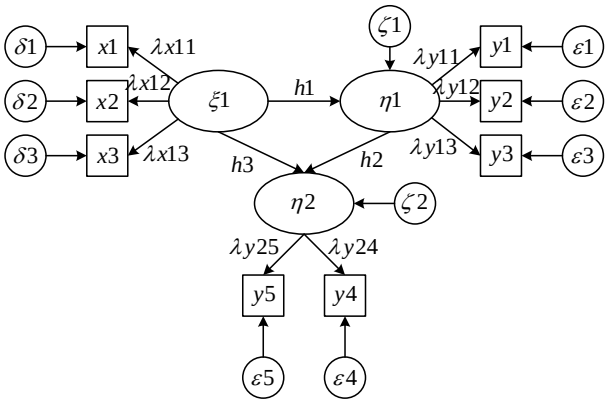

Figure 1: Structural equation model diagram

(2) Path Analysis

Path analysis serves as a crucial metric for examining causal relationships within structural equation models. It comprises three components: path diagrams, path coefficients, and impact analysis, detailed as follows.

① Path Diagram: This is a visual form that represents directional relationships between variables. The directional connections between variables in a model are often referred to as path relationships. Depending on the type of variables considered, path relationships can be

categorized into two groups, namely, latent variable → latent variable and latent variable → observed variable.

② Path Coefficients: The numbers that are assigned to path relationships are called path coefficients and they represent the magnitude of influence between variables. Regularized path coefficients typically range between 0 and 1. The closer to 1 value indicates a more significant association between the variables. Depending on the type of path relationship, there are two categories of path coefficients.

First, the path coefficients between latent variables reveal how much one latent construct influences another.

Second, the coefficients between latent variables and observed variables on a path are known as the factor loadings. It indicates the strength of relationship between each observed variable and its corresponding latent variable.

③ Influence Analysis: According to the interaction pattern between the variables, influence relationships are classified into three types. Firstly, direct effects express the influence of causal variables on outcome variables and the path coefficient between them is the strength of this influence. Secondly, indirect effects are defined as the effect of one latent variable on another latent variable via one or more meditating latent variables. To get the strength of this effect, multiply the path coefficients of all mediating latent variables that are in use. Thirdly, total effects are referred to as the sum of direct and indirect effects [24].

(3) Measurement Model

A measurement model depicts the relationships among latent variables and observed variables. Its operational principle aligns with confirmatory factor analysis, where latent variables are indirectly characterized through explicit observed variables. The measurement model is illustrated in Figure 2. Structural equation models incorporate two or more measurement models depending on the number of latent variables. The mathematical form of a measurement model is typically a matrix equation, termed a measurement equation, as shown in Equation (1):

$$\begin{cases} x = \Lambda_x \xi + \delta \\ y = \Lambda_y \eta + \varepsilon \end{cases} \tag{1}$$

In equation (1), $x = \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix}$, $\xi = (\xi_1)$, $\Lambda_x = \begin{pmatrix} \lambda_{x_1} \\ \lambda_{x_1} \\ \lambda_{x_1} \\ \lambda_{x_3} \end{pmatrix}$, $\delta = \begin{pmatrix} \delta_1 \\ \delta_2 \\ \delta_3 \end{pmatrix}$. Λ_x denotes the coefficient matrix between the exogenous latent variable ξ and the observed variables x_1, x_2, x_3. Similarly, $y = \begin{pmatrix} y_1 \\ \vdots \\ y_5 \end{pmatrix}$, where $\eta = \begin{pmatrix} \eta_1 \\ \eta_2 \end{pmatrix}$, and $\Lambda y = \begin{pmatrix} \lambda_{y_{11}} & 0 \\ \lambda_{y_{23}} & 0 \\ \lambda_{y_{33}} & 0 \\ 0 & \lambda_{y_{33}} \\ 0 & \lambda_{y_{23}} \end{pmatrix}$, $\varepsilon = \begin{pmatrix} \varepsilon_1 \\ \vdots \\ \varepsilon_5 \end{pmatrix}$. Λ_y denotes the coefficient matrix between the endogenous latent variable η and the observed variables $y_1 \cdots y_5$, while Λ_x and Λ_y are referred to as factor loading coefficient matrices.

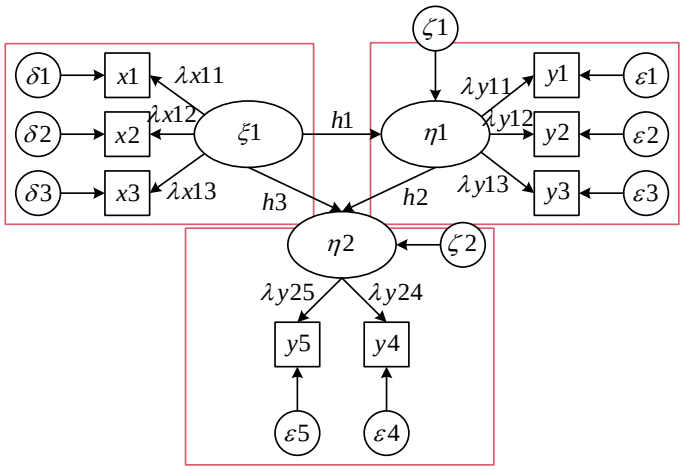

Figure 2: Measurement model

(4) Structural Model

A structural model refers to a model that illustrates the relationships among latent variables, interpreting the influence relationships between latent variables through path analysis. The structural model is shown in Figure 3. Each structural equation model contains only one structural model, and the mathematical form of the structural model is also a matrix equation, known as a structural equation, as shown in Equation (2):

$$\eta = \mathrm{B}\eta + \Gamma\xi + \zeta \tag{2}$$

In equation (2), $\eta = \begin{pmatrix} \eta_1 \\ \eta_2 \end{pmatrix}$, $\xi = (\xi_1)$, $\zeta = \begin{pmatrix} \zeta_1 \\ \zeta_2 \end{pmatrix}$ $B = \begin{pmatrix} 0h_2 \\ 00 \end{pmatrix}$, $\Gamma = (h_1 h_3)$. B denotes the coefficient matrix between endogenous latent variables η, Γ denotes the coefficient matrix between exogenous latent variable ξ and multiple endogenous latent variables η.

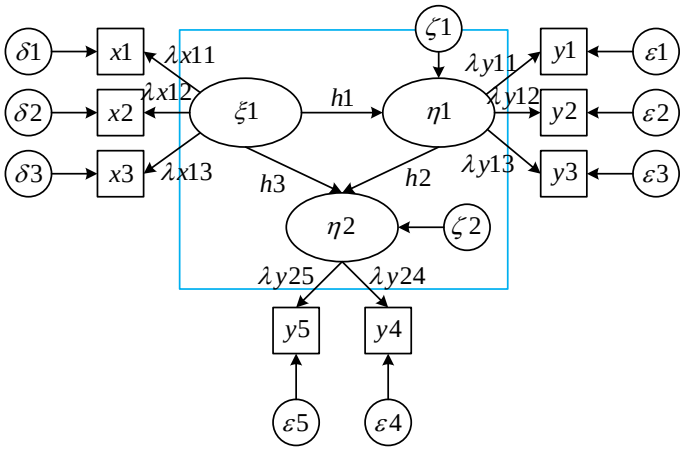

Figure 3: Structural model

Structural equation models are complex models composed of a structural model and multiple measurement models. Therefore, the fundamental equations of structural equation models, such as Equation (3):

$$\begin{cases} x = \Lambda_x \xi + \delta \\ y = \Lambda_y \eta + \varepsilon \\ \eta = B\eta + \Gamma \xi + \zeta \end{cases} \tag{3}$$

Based on the operational principles of structural equation modeling, the analytical process of this model comprises three stages: model development, model specification and evaluation, and model confirmation. First is the model development stage, where the theoretical foundation of the research is systematized. Based on this theory, the research framework is established to provide a solid basis for model hypotheses. Next is the model specification and evaluation stage, where latent variables and their relationships within the study are determined according to theoretical assumptions. These latent variables are then characterized by introducing observed variables to design the theoretical model. Based on the established relationships, parameters for evaluation are identified, followed by model identification and evaluation to assess the validity and reliability of the model. Finally, in the model specification stage, sample data is substituted into the theoretical model for fitting. Parameter estimation is performed on the fitted model. If the estimation results are reasonable, the final structural equation model is confirmed. Otherwise, model modification is required, and the above steps are repeated until reasonable results are achieved. The analysis process of the structural equation model is illustrated in Figure 4.

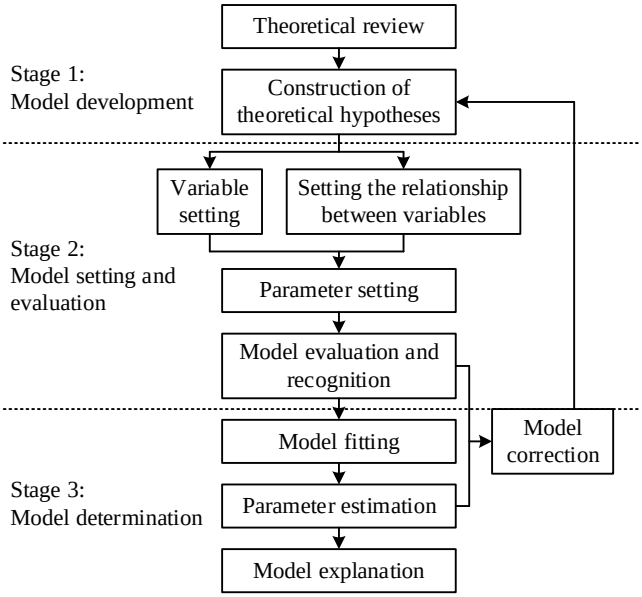

Figure 4: The analysis process of the structural equation model

2.2 Data Sources and Sample Characteristics

2.2.1 General Description of the Survey Population

This study employed SPSS software to conduct statistical analysis on the basic characteristics and various variables of the 526 valid samples collected. The basic characteristic variables primarily included grade level, gender, major category, and prior internship or practical training experience. By grade level, the survey included 143 first-year students, 155 second-year students, Third-year students numbered 228. By gender, 362 were male and 164 were female. By major category, 225 were in liberal arts and 301 in science disciplines. Regarding internship/practical training experience, 296 had such experience while 230 had none.

2.2.2 Analysis of Student Differences Across Dimensions of Professionalism Traits

(1) Grade Differences

Comparisons of differences in professional spirit characteristics across grade levels are shown in Table 1. Results indicate significant differences across all five dimensions—practical skills, professional knowledge, professional ethics, professional attitude, and professional spirit—among the sample. In particular, when it came to the skill aspect (P <0.001), third-year students scored significantly higher on the practical ability scale compared to first- and second-year students. This situation can be explained by the fact that second-year students are in the middle of their vocational training, they have already lost the excitement of their freshman year but at the same time have no sense of the importance of graduation, which makes them susceptible to complacency.

Table 1: The differences between the characteristics of the mental characteristics

Dimension	Grade	N	M	SD	F	Sig.
Practical ability	Freshman Year	143	3.37	0.78	22.031	0.000***
	Sophomore	155	3.7	0.87		
	Junior	228	4.2	0.69		
Occupational knowledge	Freshman Year	143	3.33	0.67	5.654	0.003***
	Sophomore	155	3.58	0.73		
	Junior	228	3.77	0.71		
Occupational ethics	Freshman Year	143	4.13	0.57	13.343	0.000***
	Sophomore	155	3.92	0.67		
	Junior	228	4.26	0.48		
Professional attitude	Freshman Year	143	4.2	0.59	7.239	0.000***
	Sophomore	155	3.88	0.78		
	Junior	228	4.04	0.51		
Occupational belief	Freshman Year	143	3.99	0.68	6.262	0.006***
	Sophomore	155	3.77	0.65		
	Junior	228	4.11	0.46		

(2) Gender Differences

In Table 2, the comparison of the differences between male and female students in professional spirit characteristic dimensions is presented. According to the findings, there is no significant gender difference in terms of practical skills, professional knowledge and professional attitude. Nevertheless, there is a strong gender difference in the dimensions of professional ethics (P<0.001) and professional spirit (P<0.05). The average scores on both dimensions were significantly higher among females than males, indicating that females are more aware of professional ethics and professional spirit.

Table 2: Comparison of differences in various dimensions

Dimension	Gender	N	M	Sd	T	Sig.
Practical ability	Male	362	3.86	0.85	0.593	0.577
	Female	164	3.69	0.78		
Professional knowledge	Male	362	3.6	0.81	0.305	0.764
	Female	164	3.6	0.69		
Professional ethics	Male	362	3.91	0.64	-3.944	0.000***
	Female	164	4.38	0.57		
Professional attitude	Male	362	3.77	0.67	-1.031	0.304
	Female	164	3.94	0.68		
Professionalism	Male	362	3.73	0.64	-2.578	0.011*
	Female	164	4.06	0.61		

(3) Differences Across Disciplines

Comparison between the Differences in Professional Spirit Characteristics among Various Disciplines is illustrated in Table 3. It is found that there are no significant differences in practical ability, professional knowledge, and professional attitude among disciplines. Significant differences exist in professional ethics ($P<0.01$) and professional spirit ($P<0.05$), respectively. In these two aspects, the mean values of the humanities majors are always higher than those of science majors, implying that the humanities majors have superior professional ethics and better professional spirit consciousness than the science majors.

Table 3: A comparison of the differences in various dimensions

Dimension	Professional category	N	M	Sd	T	Sig.
Practical ability	Liberal arts	225	3.73	0.74	-0.996	0.315
	Science	301	3.54	0.84		
Professional knowledge	Liberal arts	225	3.23	0.71	-0.353	0.738
	Science	301	3.3	0.65		
Professional ethics	Liberal arts	225	4.22	0.63	3.205	0.002**
	Science	301	4.04	0.68		
Professional attitude	Liberal arts	225	3.95	0.63	1.121	0.267
	Science	301	3.94	0.69		
Professionalism	Liberal arts	225	4.15	0.53	2.182	0.03*
	Science	301	3.77	0.58		

(4) Differences in Internship/Practical Training Experience

The comparison between the professional-spirit characteristics of those having internship/training experience and those not engaged in internship/training is presented in Table 4. It is found that there was no significant difference between them in relation to professional ethics, professional attitude, and professional spirit. Nevertheless, there are important differences regarding the practical ability and professional knowledge, $P<0.001$. Those students who have had internship/training experience have significantly higher mean scores than those who haven't experienced internship/training regarding practical ability and professional knowledge dimension.

Table 4: Whether there is a comparison between the different dimensions

Dimension	Practical training experience	N	M	Sd	T	Sig.
Practical ability	Yes	296	3.88	0.72	7.157	0.000***
	No	230	3.25	0.81		
Professional knowledge	Yes	296	3.56	0.74	5.354	0.000***
	No	230	3.22	0.7		
Professional ethics	Yes	296	4.3	0.56	0.549	0.571
	No	230	3.97	0.62		
Professional attitude	Yes	296	4.09	0.66	1.693	0.104
	No	230	3.92	0.64		
Professionalism	Yes	296	3.87	0.7	1.295	0.205
	No	230	4.06	0.58		

2.2.3 Statistical Analysis of Students' Professional Attributes Across Dimensions

Table 5 presents the statistical analysis of students professional ethics characteristics in different dimensions. Practical ability is the most primary competence of any excellent craftsman as well

as a critical factor in determining if a student has developed real abilities throughout his time at school. Based on the table, it can be observed that concerning the dimension of practical skills, 17 percent of the students answered positively to the question, I can master the basic operational skills of practical training equipment in my major, whereas 40.4 percent answered, mostly agree. There is a considerable percentage (37.9 percent) who answered unsure. It means that students are not confident in their operating skills in their profession or they have not been able to reach a fairly competent level. This underlines the importance of additional training of students to develop their professional operational skills that will play a fundamental role in their career development.

Table 5: Statistical analysis

		Complete mismatch (%)	Basic discrepancy (%)	Indeterminate (%)	Basic coincidence (%)	Perfect coincidence (%)
Skill dimension.	I can master the basic operation skills of this professional training equipment	0.6	4.1	37.9	40.4	17
Knowledge dimension	I have a strong foundation of professional knowledge	0.4	10.7	30.6	47.5	10.8
	I have been in the school of craftsmanship, speaking, expert lectures, etc	6	18.9	20.4	35.3	19.4
	I am good at thinking and studying my unknown questions	0.2	5.7	24.8	52.8	16.5
Moral dimension	I will take my job seriously	0	5.7	14.8	46.5	33
	I won't do bad things	0	1.7	19	48.4	30.9
	I am willing to volunteer	0.2	2.7	13.1	46.8	37.2
Professional attitude	I will struggle to realize my dream	0	4.5	13.8	48.8	32.9
	When I focus on a job, I forget to eat and sleep	0.7	7	21.7	45	25.6
	I take responsibility for everything in learning and life	0	6.7	17	55.6	20.7
Professionalism	I have the initiative to be responsible and responsible for loyalty	0	0.9	17.5	50.3	31.3
	I am happy to help each other with my classmates	0	4	15.8	53.7	26.5
	I often produce new ideas and put them into practice	0	7.4	23	54.3	15.3

3 Analysis of the Current State of Cultivating Students' Professional Ethics and Practical Skills

3.1 Overall Analysis of Professionalism Cultivation

Table 6 gives the summary analysis of the professional ethics cultivation. This table shows the current status of professional ethics cultivation among students in schools. The approaches ranked by mean scores are: curriculum instruction (mean = 3.85), practical operations (mean = 3.80), school-enterprise cooperation (mean = 3.65), campus culture (mean=3.49) and policy systems (mean=3.28). It means that curriculum instruction is more effective as compared to other approaches used in cultivating professional ethics in students. Nevertheless, there are low levels on all dimensions and therefore, the efforts to cultivate must be increased and intensified immediately.

Table 6: The overall analysis of vocational spirit cultivation

Name	N	Minimum value	Maximum value	M	SD
Campus culture	526	1	5	3.49	0.968
Course teaching	526	1	5	3.85	0.732
Practical operation	526	1	5	3.8	0.715
School cooperation	526	1	5	3.65	0.638
Policy system	526	1	5	3.28	0.966

3.2 Analysis of Dimensions in Cultivating Professionalism

The culture of the campus has a soft and slow effect on the development of the professional spirit of students, instilling an unnoticeable but very deep feeling of care. The analysis of results of surveys by the dimensions of student professional ethics cultivation is given in Table 7. In the question, Is it true that the school creates special places to support the idea of professional ethics, namely, the practical training rooms and the area of extra-curriculum activities? The following percentage of the respondents responded that: does not meet standards - 14.2%, unsure - 27.9% and meets standards - 57.9%. It shows however that although some schools have created appropriate practical training centers and space of extra-curricular activities, aimed at fostering professional ethics among their students, there are still some areas that can be improved.

Table 7: Analysis of the survey results

		Complete mismatch (%)	Basic discrepancy (%)	Indeterminate (%)	Basic coincidence (%)	Perfect coincidence (%)
Campus culture	The school has the mental publicity area of the artisan, which is established in the field of practice and extracurricular activities	1.8	12.4	27.9	35.4	22.5
	The school will use the radio, school newspaper, weibo and other platforms to promote the spirit of the artisans	1.3	15.1	24.5	37.8	21.3
	The school will organize us to watch the type of films such as "the great power craftsman" and hold the spirit of the artisans to cultivate the subject class	4.4	14.9	27.5	36.5	16.7
Course teaching	The school has a career planning course	0.2	5.1	14.9	45.7	34.1
	I think career planning courses are helpful for students' future careers	0.7	4	23.3	54.1	17.9
	Teachers will teach us the spiritual education of the craftsman in the course of specialized course	0	10.1	17.8	49.1	23
	Teachers often teach us "dedication, honesty" and so on	0	5.4	21.4	55.5	17.7
Practical operation	The training course will be strictly based on enterprise standards and norms to cultivate the spirit of the students	0	8.9	26.1	38.7	26.3
	The training room will introduce a good corporate culture and create a real professional environment	0.2	9.9	26.8	47.2	15.9
	The school will carry out the skills competition and the innovation and entrepreneurship competition to promote the spirit of the artisan	0	10.3	24.2	39.9	25.6
	The school will encourage us to actively apply for professional qualifications related to professional qualifications	0.2	4.7	18.4	55.5	21.2
School-enterprise cooperation	The school will arrange for our internship at the company	0	7.2	25.5	45.5	21.8
	The school will introduce the guidance teacher of the practical training course	0.2	10.4	29.8	45.2	14.4
	The school will establish an operational training base related to the enterprise to improve our operating ability	0.5	6.8	28.4	44.4	19.9
Policy and System	The school will arrange our policy documents on the spirit of the craftsman	1.5	17	28.2	37.2	16.1
	The school will give us a daily code of routine about the spirit of the craftsman	2.3	15.7	29.3	34.4	18.3

4 The Impact of Labor Education on Students' Professional Ethos and Practical Competencies

4.1 Basic Assumptions

Based on a behavioral response theory model for students' reactions to labor education policies, this study establishes six latent variables: school environment, off-campus environment, labor education policies, professional ethics, practical skills, and labor behavior responses. Nine research hypotheses are proposed:

Hypothesis 1: School environment has a significant positive impact on students' professional ethics.

Hypothesis 2: The off-campus environment has a significant positive effect on students' professional ethics.

Hypothesis 3: Labor education policies have a significant positive effect on students' professional ethics.

Hypothesis 4: The school environment has a significant positive effect on students' practical abilities.

Hypothesis 5: The off-campus environment has a significant positive effect on students' practical abilities.

Hypothesis 6: Labor education policies have a significant positive impact on students' practical abilities.

Hypothesis 7: Students' professional ethics have a significant positive impact on their practical abilities.

Hypothesis 8: Students' professional ethics have a significant positive impact on their labor behavior responses.

Hypothesis 9: Students' practical abilities have a significant positive impact on their labor behavior responses.

4.2 Variable Configuration and Implementation

Based on the theoretical model of students' behavioral response mechanisms to labor education policies, four observation items were designed to measure school-based and non-school-based environments respectively. Three observation items were established to measure labor awareness, practical skills, and behavioral responses to labor education policies. The measurement information contained within the latent variables is detailed in Table 8.

Table 8: Variable selection and scale design

Latent variable	Code	Measurement variable
College environment	A1	The school's publicity and evaluation of labor education
	A2	The diversity evaluation of school education course
	A3	The quality evaluation of the practice of labor education in schools
	A4	The reasonable evaluation of the standard of labor education evaluation system is established in the school
External environment	A5	Family evaluation of your participation in labor education
	A6	The family evaluates you to the support of labor education
	A7	The community evaluates your support for labor education
	A8	The new media provides the rich evaluation of the resources of labor education
Labor education policy	A9	Your understanding of the essence of "labor"
	A10	Your evaluation of the content of labor education policy
	A11	Your assessment of the necessity and importance of implementing the policy of labor education
Professionalism	A12	You're about your professional cognitive degree
	A13	You evaluate your cognitive degree of hard work
	A14	Your cognitive evaluation of your professional qualities and abilities
Practical ability	A15	The degree of willingness to participate in service practice
	A16	Evaluation of your willingness to participate in family daily practice
	A17	Your willingness to participate in creative practices is evaluated
Behavior response	A18	You are involved in the frequency evaluation of housework
	A19	Your evaluation of service labor
	A20	You participate in the frequency evaluation of innovative entrepreneurship projects

4.3 Goodness-of-Fit Test for Measurement Models

This study employed AMOS software to construct a structural equation model of student participation in labor education activities. After substituting sample data into the model and performing simulation calculations, The results indicate: CFI, NFI, TLI, and CFI were 0.931, 0.943, 0.969, and 0.964 respectively, all exceeding 0.9. The Root Mean Square Error of Approximation (RMSEA) was 0.064, below 0.08. This demonstrates that all fit indices of the structural equation model meet evaluation standards, indicating good model fit. Model fit indices are presented in Table 9.

Table 9: Model adaptation metrics

Inspection index	Evaluation Criteria	Concrete value	suitability
GFI	Greater than 0.9	0.931	Yes
RMR	Less than 0.05, the smaller the better	0.038	Yes
RMSEA	Less than 0.08, the smaller the better	0.064	Yes
NFI	It's greater than 0.9. the closer the closer 1 is	0.943	Yes
TLI	It's greater than 0.9. the closer the closer 1 is	0.969	Yes
CFI	It's greater than 0.9. the closer the closer 1 is	0.964	Yes
AIC	The smaller the better	1289.654	Yes
BCC	The smaller the better	1288.596	Yes

4.4 Estimation Analysis of Measurement Models

Estimation via structural equation modeling revealed the following significant paths at the 1% confidence level: School Environment → Professional Ethos, Labor Education Policy → Professional Ethos, School Environment → Practical Competence, Professional Ethos → Practical Competence, Professional Ethos → Labor Behavior Response, and Practical Competence → Labor Behavior Response. The path from Extracurricular Environment to Practical Competence was significant at the 5% confidence level. The path from labor education policy to practical ability was significant at the 10% confidence level. All these paths passed the significance test, indicating that Hypotheses 1, 3, 4, 5, 6, 7, 8, and 9 are supported. The path from off-campus environment to professional spirit did not pass the significance test, indicating that Hypothesis 2 is not supported. The model estimation results are shown in Table 10. The analysis results are as follows:

(1) The standardized path coefficients for “School Environment → Professional Ethos” and “Labor Education Policy → Professional Ethos” are 0.608 and 0.364, respectively. This indicates that both the school environment and labor education policy exert significant positive effects on professional ethos. Specifically, the better the external environment created by the school for labor education or the more effectively labor education policies are implemented, the higher students' cognitive level regarding labor. Comparing the standardized path coefficients reveals that the school environment exerts a greater influence on professional ethics than labor education policies.

(2) The standardized path coefficients for “School Environment → Practical Ability,” " Labor Education Policy—Practical Ability,“ and ”Extracurricular Environment—Practical Ability" are 0.428, 0.064, and 0.088, respectively. This indicates that school environment, labor education policy, and extracurricular environment all exert significant positive effects on practical ability. Specifically, the better the external environment created for labor education by schools, families, or communities, or the more effectively labor education policies are implemented, the stronger students' participation in practical activities becomes. Comparing the standardized path coefficients reveals that the school environment exerts the strongest influence on practical ability, labor education policy has the weakest impact, and the external environment falls between the two. Additionally, the standardized path coefficient for “Professional Ethos—Practical Ability” is 0.45, indicating that professional ethos significantly and positively influences practical ability. That is, the higher students' professional ethos, the stronger their willingness to engage in labor.

(3) The standardized path coefficients for “Professional Ethos—Labor Behavior Response” and “Practical Ability—Labor Behavior Response” were 0.601 and 0.304, respectively. This indicates that both professional ethos and practical ability exert a significant positive influence on labor behavior response. That is, the higher students' professional ethos or the stronger their willingness to participate in labor, the greater their behavioral response to labor education policies.

Table 10: Model estimation results

Path	S.E.	C.R.	P	Standard coefficient	Whether the hypothesis holds true
Hypothesize 1: University environment - Professionalism	0.039	15.968	***	0.608	Set up
Hypothesize 2: External environment - Professionalism	0.035	0.027	0.985	0.000	Out of reach
Hypothesize 3: Labor education policy - Professionalism	0.03	12.871	***	0.364	Set up
Hypothesize 4: University environment - Practical ability	0.06	8.258	***	0.428	Set up
Hypothesize 5: External environment - Practical ability	0.079	2.255	0.025	0.088	Set up
Hypothesize 6: Labor education policy - willingness to work	0.051	12.787	0.089	0.064	Set up
Hypothesize 7: Professionalism - Practical ability	0.062	8.366	***	0.45	Set up
Hypothesize 8: Professionalism - labor response	0.053	13.336	***	0.601	Set up
Hypothesize 9: Practical ability- labor response	0.047	7.579	***	0.304	Set up

5 Optimized Strategies for Cultivating Students' Professional Ethics and Practical Competencies

5.1 Transform the concept of labor education and improve the labor education system.

5.1.1 Uncovering the Distinctive Features of Vocational Education in Schools

Schools should actively innovate methods and approaches to labor education, infusing new vitality into the Chinese spirit of labor and the spirit of model workers. The nation advocates four respects, foremost among which is respect for labor. To unify thinking, we must recognize that labor creates humanity and generates value. As the most fundamental practical activity for human survival, labor—whether physical or mental, simple or complex—deserves the utmost respect from society as a whole. At the same time, schools must flexibly grasp the concepts of labor education in the new era.

5.1.2 Establishing School Labor Education Objectives

The main goal of labor education in schools in the new era is to create a highly-developed workforce of skilled technical specialists. Through practical training, institutions have the opportunity to evaluate the latest social tendencies in order to determine the modern demand on the workers in their particular professions (it will allow the students to see how much their specialization can be applied to various areas). This method creates a culture of respect and enthusiasm towards work in students. Besides, it allows them to realize that the acquisition of professional knowledge and its implementation in entrepreneurship or employment turns such skills into beneficial contributions to the society.

5.2 Improve labor education curricula and innovate labor education content

5.2.1 Expanding School Labor Education Practice Platforms

In general, the professional education program of higher vocational schools needs to be optimized. As part of the national strategy of growing specialized professionals, it is necessary to implement innovative methods of labor management education and use the best practices of higher vocational institutions to develop a specialized educational program in vocational labor education that is holistic, open, specific, and practical in its approach to teaching. Educational institutions must create self-standing compulsory labor classes, incorporating labor education materials into the education of different technical professionals actively. Labor education courses should have clear guidelines regarding assessment systems, teaching models, and delivery formats, utilizing the variety of instructional strategies available to them to make labor education as effective as possible. Labor education courses should be held on campus twice a week. They need to combine with specialized training facilities to offer a variety of labor education, imparting both the professional skills to students and importance of labor. Active solicitation of feedback on the experiences of students in classes should also be performed to identify areas of improvement, update teaching materials accordingly, and explore teaching frameworks that are easier to access and more flexible to students.

5.2.2 Focus on the Innovative Integration of Labor Education and Ideological and Political Courses

To begin with, expand work-study positions. Schools can enter into partnership with companies to offer work-study positions to students who are financially challenged so that they could get a source of income through work and reduce the economic strain on their parents. There are many students who have to make money on holidays or during internships because their families cannot afford it. Such an approach is quite efficient in terms of reducing their financial problems. Thirdly, place more emphasis on the creation of labor positions. School-enterprise partnerships are conducive to favorable student labor conditions due to agreements made between institutions and businesses. Nevertheless, other schools fail to take advantage of such partnerships, keeping students in campus training facilities, instead of exposing them to practical business settings. It also restricts their experience in real working positions, labor intensity and production standards. Thus, school-enterprise cooperation should be reinforced to develop sound labor educational environments in students.

5.3 Strengthen the capacity to support labor education and enhance its quality.

5.3.1 Expanding School Labor Education Practice Platforms

Administrative departments of education at all levels should coordinate their efforts depending on the specific features of schools to create labor practice platforms that promote labor education among students. The available comprehensive practice facilities and out-of-school student practice sites must be used to construct these platforms. Specifically, the facilities and equipment of the schools are able to satisfy various needs of students in terms of practical experience, which can offer them an opportunity to receive labor education. It is also possible to develop appropriate measures to allocate mountains, meadows, and other places as practice areas to students, where practical labor may evaluate their vocational competence and develop their expertise. Also, schools can team up with social organizations like urban and rural welfare

facilities, nursing homes, and kindergartens to organize service-oriented labor events within the framework of students. This strategy slowly improves the consciousness of students about labor education and increases their technical skills.

5.3.2 Optimizing the Structure of the School Faculty

In order to implement the labor education in a more effective manner, schools should constantly refine their faculty structure through forming a teaching staff consisting of both full-time and part-time teachers. The structural optimization will not only improve the level of labor education but also offer students with more diverse and practical experiences associated with labor education. The teachers should have strong theoretical knowledge in labor education besides having a great deal of practical experience as to lead them to understand the importance of it better. At the same time, educational institutions can work with businesses and organizations to bring in experts with ample practical experience to act as part-time instructors, offering more lively and practical lessons on labor education to the students.

6 Conclusion

Labor education in schools needs to be constantly innovative and optimized to satisfy the requirements of the society to have highly skilled technical workers. In this connection, in the given paper, the interdependence between the development of professional ethics in students and their practical skills is examined via structural equation modeling with the help of students of a particular institution as the research participants. Strategies of cultivation and optimization are proposed. The findings that were made are:

(1) School environment has a positive impact on the students professional ethics as well as their practical capabilities. Positive effects on labor behavior responses are brought about by school environment, external environment, and labor education policies in the form of professional ethics and practical abilities. Both professional ethics and practical abilities have positive effects on labor behavior responses.

(2) The schools have the opportunity to establish a well-received campus labor culture as a way of enhancing the environment surrounding the labor education. At the same time, it is important to optimize the assessment system of labor education to effectively monitor the quality of education and incentive structures. Improving the level of support of labor education consists in the enhancement of faculty development and in the provision of the required material and financial assistance.

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References

[1] Ji, B. (2023). Value Implications and Practical Path of Youth Labor Education in the New Era. Curriculum and Teaching Methodology (4).

[2] Zhang, L. H. (2023). Study on the practical significance and practical path of labor education in normal university in the new era. Frontiers in Educational Research, 6(4), 10-25236.

[3] Chen, H., & Yao, M. (2025). Research on the Talent Cultivation of Teacher Ethics in Higher Vocational Colleges under the Fundamental Task of Moral Education. Advances in Education, Humanities and Social Science Research, 13(1), 382-382.

[4] Worthington, R. P. (2015). Ethics and professionalism in a changing world. Investigación en educación médica, 4(15), 175-178.

[5] ZHANG, H. D. (2018, April). Cultivation Countermeasures of Vocational College Students' Professional Ethics Education from the Perspective of Craftsman Spirit. In 2018 4th Annual International Conference on Modern Education and Social Science (MESS 2018) (pp. 247-251). Atlantis Press.

[6] Wang, Y., Hu, D., & Sun, M. (2021). An analysis of labor education ideas for college students in China. Education, Sustainability & Society (ESS), 4(1), 25-27.

[7] Zhang, S., & Yan, Z. (2021). Discussion on the Ways and Methods of Labor Education for College Students. Frontiers in Economics and Management, 2(1).

[8] He, Q. (2017, May). The Realistic Predicament of the" Spirit of the Craftsman" in Higher Vocational Education. In 2017 4th International Conference on Education, Management and Computing Technology (ICEMCT 2017) (pp. 402-406). Atlantis Press.

[9] Wang, G., Wang, H., Gu, X., & Zheng, F. (2025). Impact of College Counselors' Spiritual Guidance Behaviors on Chinese College Students' Employment Anxiety: The Chain-Mediated Roles of Resilience and Career Calling. Frontiers in Psychiatry, 16, 1586101.

[10] Meng, S., Tao, F., & Han, L. (2020, October). The joint development of college labor education and quality education based on the new era. In 2020 International Conference on Computers, Information Processing and Advanced Education (CIPAE) (pp. 53-56). IEEE.

[11] Liu, Q., & Qiu, G. (2024, August). Vocational Colleges Use Labor Education to Promote the Path of Cultivating the Spirit of Artisans. In 2024 5th International Conference on Education, Knowledge and Information Management (ICEKIM 2024) (pp. 141-150). Atlantis Press.

[12] Qin, C. (2024). Paths and Strategies for Cultivating Students' Practical Abilities in Vocational Education. International Journal of Educational Teaching and Research, 1(2).

[13] Wu, Y. (2024). The Role of Labor Education for Disadvantaged Students in Promoting Vocational Skill Development. Journal of Modern Educational Theory and Practice, 1(3).

[14] Zhong, F. (2021). The value implication and practical direction of labor education for contemporary college students. Journal of Simulation, 9(1), 19-24.

[15] Zhang, D. (2023). Practical Education and the Cultivation of Professional Competence: Reform Strategies for Vocational Education. Advances in Vocational and Technical Education, 5(13), 16-22

[16] Wu, S., Duan, J., & Luo, M. (2024, February). Evaluating and analyzing student labor literacy in China's higher vocational education: an assessment model approach. In Frontiers in Education (Vol. 9, p. 1361224). Frontiers Media SA.

[17] Belfield, C. R., & Bailey, T. R. (2019). The labor market value of higher education: Now and in the future. Higher Education: Handbook of Theory and Research: Volume 34, 373-414.

[18] Zhou, Y., & Han, J. (2023). Research on the Cultivation of Labor Literacy in Project-based Teaching in Higher Vocational Schools. In SHS Web of Conferences (Vol. 179, p. 04004). EDP Sciences.

[19] Du, Y., & Li, W. (2024, September). Innovative research on the community of education and practice model of labor education in colleges and universities. In 2024 14th International Conference on Information Technology in Medicine and Education (ITME) (pp. 445-449). IEEE.

[20] Xuede, X., Xinyu, Z., Ye, L., Zihan, L., Yuewang, Z., Yifan, W., & Feifan, B. (2023). Analysis of the Role of Labor Education in the Growth Education of College Students. Frontiers in Educational Research, 6(20).

[21] Luo, X. (2023). Labor Education Course for College Students in the New Era-Deep Integration of Theory and Practice. Journal of Theory and Practice of Contemporary Education, 3(10), 23-27.

[22] Fan, G., & Zou, J. (2020). Refreshing China’s labor education in the new era: policy review on education through physical labor. ECNU Review of Education, 3(1), 169-178.

[23] Julia Kim Walther, Martin Hecht, Benjamin Nagengast & Steffen Zitzmann. (2025). Multilevel Multigroup Structural Equation Modeling In A Single-Level Framework. Structural Equation Modeling: A Multidisciplinary Journal, 32(5), 897-928.

[24] Mohamed Ibrahim Nor. (2025). Exploring the nexus of education finance, governance, and sustainability in Somalia’s post-conflict education sector: a structural equation modeling analysis. Frontiers in Education, 10, 1552668-1552668.