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How Does the Quality of Education Affect the Employment Quality of Secondary Vocational School Graduates?

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Abstract: Secondary education is an important stage for individuals to acquire the skills needed in the labor market. In recent years, the trend of pursuing higher education after secondary vocational education has weakened the relationship between the two. As an important stage for the cultivation of skills among secondary vocational education students, the influence of secondary education on the employment quality of secondary vocational school graduates has not received sufficient attention. An analysis of a sample survey of graduates from 10 schools participating in the "Winning the Future" Phase II project in 2023 found that cognitive abilities, non-cognitive abilities, and skills all promote high-quality employment for secondary vocational school graduates to varying degrees. Further analysis indicates that students with excellent academic performance and personality traits such as openness, extroversion, and agreeableness are more likely to achieve high job satisfaction, while skill certificates and general skills help secondary vocational school graduates obtain jobs matching their qualifications. Future development in vocational education should focus on the influence of secondary education on secondary vocational school students to help graduates achieve high-quality employment.

Keywords: Secondary vocational school graduates; Secondary education; Employment quality

1. Introduction

In recent years, with the upgrading of China's industries demanding higher skilled talents [1] and the gradual improvement of the vocational education system [2], secondary vocational education has been influenced by the trend of pursuing higher education, leading to a sharp decrease in employment support for those who directly seek employment at the school level [3]. For individuals opting for employment, can the talent cultivation system of secondary vocational education provide them with necessary support? At the same time, compared to individuals with only junior high school education, those with secondary vocational education usually enjoy higher employment quality [4]. In developing countries, secondary vocational education may serve as an important pathway for adolescents with low incomes or little interest in pursuing higher education to acquire job-related skills, facilitating a smooth transition from school to work [5]. However, some scholars sharply point out that young people nowadays tend to avoid receiving secondary vocational education in favor of higher education, as a background in secondary vocational education may lead them to unemployment or engagement in repetitive, boring, and low-paying jobs [6]. Furthermore, some researchers and policymakers believe that current secondary vocational education fails to meet the needs of the economy and the labor market [7], indicating a disconnect between secondary vocational education and the demands of the labor market and the economy [8]. The debates over the uselessness and cancellation of secondary vocational education are ongoing.

Nevertheless, the value of secondary vocational education for employment still exists. Firstly, from an individual perspective, there is still a portion of demand for employment within the secondary vocational education group. According to a survey of national secondary vocational graduates conducted by the China Institute of Education Finance of Peking University in 2020, among nearly 17,000 samples, 35% of secondary vocational graduates were directly employed after graduation, while approximately 65% chose to pursue further education [9].

Furthermore, the group of secondary vocational graduates who directly enter the workforce exhibits distinct regional characteristics, with minimal differences in the eastern and central regions, where approximately 33% of secondary vocational graduates are directly employed, compared to a higher proportion of 44% in the western regions [10]. Secondly, from an industrial perspective, there is still demand for graduates at the secondary vocational level within domestic industries and enterprises. According to a survey conducted by Cha Jide on 159 enterprises in the Pearl River Delta region of China, the demand rate for graduates with higher vocational and undergraduate degrees reached 64.66%, while the demand rate for graduates with only high school or secondary vocational education remained at 22.678% [11]. Domestic industries have not completely displaced secondary vocational labor. Additionally, there are variations in demand for secondary vocational graduates across different industries.

Despite a weakening demand for secondary vocational graduates in technology-intensive and state-owned large and medium-sized enterprises due to industrial transformation and upgrading, service-oriented industries such as catering and tourism still have significant demand for secondary vocational graduates.

Lastly, from an international perspective, the role of secondary vocational graduates in supplementing the national labor supply cannot be overlooked [12]. Secondary vocational graduates from countries such as South Korea [13], Russia [14], and Finland [15] still make important contributions to their respective labor markets. Drawing lessons from international experiences, when there is a mismatch between a country's education system and the actual demands of the labor market, such as cyclic saturation or shortages in certain professions within the education system, coupled with a divergence from the labor market [16], secondary vocational graduates, who have slightly superior skills compared to general high school graduates, can serve as a reservoir of labor. In this context, studying the impact of education quality on the employment quality of secondary vocational graduates can not only evaluate the effectiveness of secondary vocational education in cultivating skilled talents but also address potential imbalances between skill demand and supply [17], thereby enhancing the effectiveness of the supply of secondary vocational skilled talents [18].

2. Related Studies

This paper focuses on the employment quality of secondary vocational education graduates, especially the impact of high school education experience on the employment quality of secondary vocational graduates. Employment quality is measured in multiple dimensions, including salary income, welfare benefits, work intensity, and subjective satisfaction [19]. Domestic scholars define employment quality with objective indicators such as monthly income, daily working hours, and the frequency of job changes in the past three years, as well as subjective indicators such as job content satisfaction, occupational reputation satisfaction, and job prospect satisfaction [20]. It is worth noting that the objective and subjective dimensions do not correspond one-to-one, and a high score in the objective dimension does not necessarily mean excellent scores in the subjective dimension [21]. Excessive emphasis on the objective dimension may lead to the dilemma of "adequate employment for secondary vocational graduates" with the main manifestation being that secondary vocational graduates are "employed but not in ideal jobs," reflecting the essence of "the mismatch between individuals and positions limits the utility of human capital" [22]. The objective dimension of employment quality may not accurately reflect the "true employment status" of secondary vocational graduates, while the subjective satisfaction evaluation is a universally recognized evaluation principle domestically and internationally [23]. Therefore, this paper focuses on the subjective dimension of "employment satisfaction," aiming to explore the satisfaction of secondary vocational graduates with their current jobs in the early stages of entering the labor market.

Currently, there is a phenomenon where vocational education talent cultivation lags behind economic structural adjustments and industrial transformation [24], and some vocational education talents experience vertical mismatch (mismatch between job and education level) and horizontal mismatch (mismatch between job and major) [25]. Inadequate education and overeducation [26] both affect employment satisfaction. Many countries have a prevalent model of overeducation [27], and existing studies have found that education beyond what is required by the profession can decrease educational returns [28], significantly impact wages negatively [29], and consequently reduce graduates' employment satisfaction. However, the alignment of graduates' interests with their majors has a positive impact on employment satisfaction [30], and the alignment between learning and application significantly improves employment quality [31]. In other words, the degree of alignment between graduates' majors and occupations to some extent determines the level of employment quality [32]. Therefore, this paper measures the employment quality of secondary vocational graduates in three dimensions: employment satisfaction, alignment between job and education level, and alignment between job and major.

Previous studies on the employment of secondary vocational school graduates have emphasized the impact of individual utility and educational factors on employment quality, finding that economic factors, social factors, pressure factors, and content factors all affect the employment performance of secondary vocational school graduates [33]. Some studies have also found that compared to graduates from general high schools, the employment performance of secondary vocational school graduates who enter undergraduate institutions for further education shows no significant difference in actual starting salaries, but the wage expectations of secondary vocational school graduates are significantly lower, and their probability of job satisfaction is significantly higher [34]. In recent years, a few studies have focused on the impact of secondary vocational education experiences on the medium and long-term development of graduates. For example, Li Guirong et al. [35] found that closed management increases the study time of secondary vocational students in school, but it does not significantly improve students' academic and professional skills, psychological qualities, sense of knowledge and skill acquisition, behavioral performance, and dropout rate; at the same time, from the perspective of students' post-graduation status, although closed management increases the probability of graduates entering higher education institutions, it reduces the starting salary and job satisfaction of graduates, and has no significant impact on the degree of integration between learning and application, job development prospects, and job stability. In summary, existing studies on the employment of secondary vocational school graduates have mainly focused on the influence of individual factors and school management factors on post-graduation labor market performance, without exploring the role of the development level of students' abilities in secondary vocational schools on future employment.

The cognitive and non-cognitive development of high school students may both influence their achievements in the labor market. Proponents of cognitive ability argue that there is strong support for the return on cognitive skills in the labor market, but the impact of non-cognitive skills often does not show statistical significance [36]. Conversely, opponents of cognitive ability

argue that there is a weak link between cognitive ability and labor market performance. Gintis [37] and Bowles [38], after analyzing research data from 1960 to 1990, found that non-cognitive abilities accounted for 80% of the return in the labor market among the abilities cultivated in school, whereas the correlation between cognitive abilities and labor market performance was weaker. Meanwhile, neutral viewpoints suggest that there is no statistically significant relationship between cognitive and non-cognitive skills and wages at ages 19-21 [39]. Secondary vocational employment groups are in their prime youth age of 18-22, and whether cognitive abilities affect employment quality remains to be further studied.

Scholars almost unanimously acknowledge the contribution of non-cognitive abilities in facilitating students' connection with the labor market. Li Xiaoman [40] found that conscientiousness, a non-cognitive ability, significantly increases the income level of secondary vocational graduates, with a more pronounced effect on female graduates, and conscientiousness and neuroticism enhance employment stability, thereby improving the employment quality of secondary vocational graduates. For secondary vocational employment groups, conscientiousness is the personality trait with the highest return rate among the Big Five personality traits [41]. Similar conclusions were drawn by Zhao Xiaoyu [42], suggesting that conscientiousness plays a crucial role in the career development of secondary vocational students. Gao Fangning [43], using the CFPS database, discovered that the neuroticism, openness, and extraversion of young individuals are more critical for enhancing employment quality. Additionally, Wu Xuefeng [44], from the perspective of occupational identity, found that extraversion, agreeableness, conscientiousness, and openness of secondary vocational students effectively promote their occupational identity. Overall, many scholars have used the Big Five personality traits to examine their impact on the employment of secondary vocational graduates, but fewer have examined their influence on the subjective dimension of employment quality for secondary vocational graduates.

Drawing on the establishment process of the National Vocational Qualification Certificate system in the United Kingdom, domestic scholars acknowledge the positive impact of certificates on the employment of vocational education students [45], and vocational skill certificates play a special role in the labor market as a "skill identification" mechanism [46]. Some scholars have studied the mechanism by which skills competitions in South Korea promote peer exchange in vocational education and students' employment development [47], while others have studied the reasons for and influencing factors of the changes in the skills competition system in Chinese vocational schools [48]. Domestic scholars unanimously encourage vocational education institutions to attach importance to skills competitions to enhance employment quality, but there is little research analyzing the impact of skills competitions on the early labor market performance of secondary vocational school graduates at the high school level. General abilities are closely related to employability, and previous studies have found that general abilities promote employment quality [49], such as general skills contributing to the employment quality of future accountants and auditors [50]. However, faced with the "skill degradation" under the impact of automation technology in modern industrial labor [51] and the school atmosphere of "emphasizing academics over skills" in vocational schools, how much do the skills of secondary vocational school students affect their employment quality? This paper measures the skill levels of secondary vocational graduates based on both objective dimensions (vocational skill certificates, participation and awards in skills competitions) and subjective dimensions (level of occupational general abilities).

In summary, this paper reveals how educational quality affects the high-quality and full employment of secondary vocational school graduates in China through three dimensions: cognitive ability, non-cognitive ability, and skills. It focuses on analyzing the influence of educational quality on the early labor market performance of secondary vocational school graduates.

3. Research Design

3.1. Data

The sample data for this study were obtained from the baseline survey conducted by the research team at Peking University from May to June 2023 and the follow-up survey conducted from November to December 2023. The subjects were the employment groups of recent graduates from 10 secondary vocational schools. The survey utilized a stratified cluster sampling method, selecting classes from the "Winning the Future" project schools in Sichuan, Guizhou, Guangdong, and Jiangxi. After removing observations with less than 5 minutes of response time, the sample contained 644 student data points, and missing values were imputed using multiple imputation methods.

3.2. Variables

The dependent variable in this study is employment quality, which includes three dimensions: job satisfaction, alignment between job and education level, and alignment between job and major. The independent variables include three dimensions: cognitive ability, non-cognitive ability, and skills.

In terms of cognitive ability, we chose to construct student cognitive development indicators from three dimensions: objective dimensions (grade ranking and sequence test) and subjective dimensions (learning engagement).

Among them, the sequence test in mathematics selected the second set of sequence questions from the cognitive test in the individual questionnaire of the China Family Panel Studies (CFPS) [52] in 2020. Following the CFPS usage method, all respondents underwent a two-stage adaptive test. In the first stage, respondents were required to answer 3 questions. The number of correct answers in the first stage was used to determine the questions respondents needed to answer in the second stage. Based on the Guttman Scale method, the score range for the sequence test questions derived from this method is from 0 to 15 points.

Learning engagement is adapted from the Work Engagement Scale by the Schaufeli team [53] and later revised by Fang Laitan [54], Shi Kan, and Zhang Fenghua. The scale includes 17 items, covering three dimensions: vigor, dedication, and absorption. Due

to the limitations of the questionnaire length, this study selected the "dedication" dimension. Dedication (e.g., "I feel happy when I am concentrating on my studies") refers to the positive emotional experiences brought about during the learning process and includes 5 items. A higher score indicates a higher level of positive emotional experiences during the learning process.

In terms of non-cognitive abilities, the Big Five personality traits were selected to construct student non-cognitive ability indicators. The Big Five personality traits were referenced from Wang Chunchao [55], Liang Wenyi [56], among others, using the short version of the Big Five personality traits scale from the individual questionnaire of the China Family Panel Studies (CFPS) in 2018. This scale includes five dimensions: openness, conscientiousness, extraversion, agreeableness, and neuroticism. The scale has been widely used in both the psychology and economics fields in China. It was found that after removing reverse questioning, the scale demonstrated high reliability and validity [57].

Regarding skill levels, both objective dimensions (vocational skill certificates, participation and awards in skills competitions) and subjective dimensions (the Occupational General Ability Level Scale) were selected for construction.

The Occupational General Ability Level Scale is based on the Occupational Information Network database (O*NET) from the United States, and it includes seven abilities: systems analysis, deductive reasoning, oral expression, written comprehension, written expression, mathematical knowledge, and data analysis.

Table 1: Variable Descriptions

Variable Type	Variable	Variable Description
Dependent Variable: Employment Quality	Satisfaction with Job	1=Very dissatisfied; 2=Dissatisfied; 3=Average; 4=Satisfied; 5=Very satisfied
	Match between Job and Education	Scored from 1 to 5, with 1 being the lowest
	Match between Job and Major	Scored from 1 to 5, with 1 being the lowest
Grades are divided into three groups: 1=Top 25%, 2=Middle 50%, 3=Bottom 25%		
1=High engagement; 0=Low engagement		
The score range for mathematical sequence questions is -121.1 to 300.4 points		
Independent Variable: Non-cognitive Ability	Big Five Personality Traits	The Big Five personality traits include openness, conscientiousness, extraversion, agreeableness, and neuroticism. Each dimension ranges from 0 to 15 points.
Independent Variable: Skill Level	Skill Certificate	Has a skill certificate (qualification certificate, 1+X certificate)=1, does not have=0
	Competition Participation	Has participated in at least one competition at the provincial level or above, municipal level, or school level or above in vocational universities and other general skills competitions=1, has not participated=0
	Competition Achievement	Has won at least one award in competitions at the municipal level or above=1, has not won=0
	General Abilities	The scores for system analysis range from -0.504 to 6.892 points, deductive reasoning from -0.592 to 6.570 points, oral expression from 0.423 to 5.752 points, written comprehension from 0.465 to 5.836 points, written expression from 0.673 to 5.509 points, mathematical knowledge from -0.288 to 6.339 points, and data analysis from -0.985 to 6.014 points.
Control Variables: Personal Characteristics	Household Registration	0=Agricultural, 1=Non-agricultural
	Gender	0=Female, 1=Male
	Place of Residence for Education	0=Non-native, 1=Native
	Educational Expectation	0=Secondary education, 1=Associate degree, 2=Bachelor's degree or higher
Control Variables: Family Characteristics	Family Assets	The scale used measures family assets of vocational school students, categorized into low, medium, and high assets, with scores of 8 or below, 9-12, and 13 or above, respectively.
	Non-first-generation University Students	1=Non-first-generation university students, 0=First-generation university students

The control variables in this study include individual characteristics and family background. Under individual characteristics, the control variables include household registration, whether the individual attended school locally, gender, and educational expectations. Under family background, the control variables include family economic background (family assets) and family cultural background (first-generation university students). The measurement of family assets utilizes a scale developed by Yi Hongmei [58] and others in the "Construction of Vocational Education Quality Evaluation and Accreditation System Project:

Henan (2013-2021)" project. After conducting principal component analysis on the assets owned by families, they were categorized into three groups: low, medium, and high assets. Please refer to Table 1 for specific variable descriptions.

The descriptive statistics of the main variables are shown in Table 2. The mean of job satisfaction in this sample is higher than that of job-title matching and major matching. The mean score for mathematics is 77.9, with a standard deviation of 76.82, indicating an uneven distribution of mathematics scores. The mean value for skill certificates is 0.356, indicating a significantly low proportion of obtaining skill certificates within the vocational group.

Table 2: Descriptive Statistics of Main Variables

Variable Type	Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
Dependent Variable: Employment Quality	Job Satisfaction	644	3.153	0.912	0.539	5.961
	Job-Education Matching	644	2.898	1.268	-0.499	6.415
	Job-Major Matching	644	2.842	1.404	-1.291	6.107
Independent Variable: Cognitive Ability	Top 25% Ranking	644	0.396	0.492	-1	1
	Top 50% Ranking	644	0.437	0.451	0	1
	High Learning Engagement	644	0.594	0.467	0	1
	Mathematics Score	644	77.90	76.82	-121.1	300.4
Independent Variable: Non-cognitive Ability	Openness	644	8.480	5.729	0	15
	Conscientiousness	644	7.696	5.118	0	15
	Extraversion	644	8.233	5.583	0	15
	Agreeableness	644	7.759	5.127	0	15
	Neuroticism	644	6.915	4.673	0	15
Independent Variable: Skill Level	Skill Certificate	644	0.356	0.458	-0.516	1.666
	Competition Participation	644	0.510	0.542	-0.134	2.249
	Competition Achievement	644	0.314	0.464	0	1
	System Analysis	644	2.873	1.320	-0.504	6.892
	Deductive Reasoning	644	2.995	1.146	-0.592	6.570
	Oral Expression	644	3.056	1.088	0.423	5.752
	Written Comprehension	644	2.985	1.189	0.465	5.836
	Written Expression	644	3.009	1.075	0.673	5.509
	Mathematical Knowledge	644	2.818	1.169	-0.288	6.339
	Data Analysis	644	2.826	1.222	-0.985	6.014

Table 2: Continued

Variable Type	Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
	Registered Permanent Residence	644	0.382	0.465	-0.666	1.696
Control Variables: Personal Characteristics	Gender	644	0.452	0.498	0	1
	Studying in Registered Residence	644	0.613	0.475	-0.744	1.584
	Educational Expectation	644	1.520	0.752	0	3.338
Control Variables: Family Characteristics	Family Assets	644	1.283	0.795	0	2
	Non-first-generation University Students	644	0.0703	0.222	-0.466	1

3.3. Model

To examine the relationship between the quality of vocational school education and employment quality, this study selects the Ordinary Least Squares (OLS) multiple linear regression model based on the type of dependent variable. The model is as follows:

$$Y_i = \beta_0 + \beta_1 COG_i + \beta_2 NONCOG_i + \beta_3 SKILL_i + \beta_4 IND_i + \beta_5 FAM_i + \beta_6 SCH_i + \varepsilon_i$$

In the above equation, Y_i represents all variables measuring the employment quality of vocational school graduates, including job satisfaction, job-education matching, and job-major matching. COG represents variables of cognitive ability, including ranking, learning engagement, and mathematics score. NONCOG represents variables of non-cognitive ability, including the Big Five personality traits. SKILL represents variables of skill level, including objective skill dimensions (certificates, competition participation, and competition achievement) and subjective skill self-assessment (system analysis, deductive reasoning, oral expression, written comprehension, written expression, mathematical knowledge, data analysis). β_1-β_5 are the coefficients of primary interest in this study, indicating the impact of education quality on the employment quality of vocational school graduates after controlling for individual (IND), family (FAM), and school (SCH) characteristics.

4. The Impact of Education Quality on Employment Quality of Vocational School Graduates

4.1. The Influence of Cognitive Ability on Employment Quality of Vocational School Students

This paper analyzes the impact of three dimensions: ranking, learning engagement, and mathematics scores, on the employment quality of vocational school students. All models control for individual characteristics, family background variables, and school fixed effects. From Table 3, it can be observed that being in the top 25% of rankings has a positive effect on job satisfaction, job-education matching, and job-major matching at the 1% significance level. Being in the top 50% of rankings has a positive effect on job satisfaction and job-major matching at the 5% significance level and on job-education matching at the 1% significance level. This indicates that vocational school students with excellent academic performance in high school have higher employment quality in the early labor market, especially in terms of job-education and major matching. The level of academic ranking to some extent reflects the cognitive ability of vocational school students, and cognitive ability is an important component of employable skills [59], especially in developing countries, where higher cognitive ability is associated with greater and longer enrollment rates and academic achievements. The enhancement of cognitive ability is also related to the increase in wages and employment opportunities in developing countries [60]. Currently, vocational education at the secondary level serves as the foundation of vocational education, and its role in enabling vocational school students to gain bargaining power in the labor market is commendable.

Mathematics scores significantly reduce the job satisfaction and job-education matching of vocational school students at the 5% significance level and reduce job-major matching at the 1% significance level. Previous studies have found that the rate of excessive occurrence of mathematical skills in the Chinese high school stage is as high as 33.01%, while the rate of insufficient mathematical skill occurrence is 0%. Compared with junior high school, junior college, and bachelor's degree or higher, the labor force in the high school stage is the group with the highest rate of excessive occurrence of numerical skills [61]. This to some extent implies that the mathematical education received by vocational school students in high school has limited connection with the knowledge and skills required in the early labor market.

Table 3: The Influence of Cognitive Ability on Employment Quality of Vocational School Students

Variable	(1) Job Satisfaction	(2) Job-Education Matching	(3) Job-Major Matching
Top 25% Ranking	0.320***	0.521***	0.599***
	(0.123)	(0.177)	(0.187)
Top 50% Ranking	0.283**	0.558***	0.453**
	(0.134)	(0.190)	(0.205)
High Learning Engagement	0.133*	0.0107	0.0183
	(0.0777)	(0.106)	(0.113)
Mathematics Score_guttman	-0.00124**	-0.00140**	-0.00351***
	(0.000500)	(0.000668)	(0.000706)
Control for Individual Characteristics	YES	YES	YES
Control for Family Background	YES	YES	YES
Control for School Fixed Effects	YES	YES	YES
Observations	644	644	644
R^2	0.0768	0.0619	0.1188

Note: * p<0.1, ** p<0.05, *** p<0.01; Standard errors in parentheses.

4.2. The Impact of Non-Cognitive Abilities on Employment Quality among Secondary Vocational School Students

This paper analyzes the influence of the Big Five personality traits on students' employment quality, with all models controlling for individual characteristics, family background variables, and school fixed effects. Given the potential collinearity among the five personality traits in the Big Five, each trait is individually included in the regression model to detect its impact. Table 4 indicates that, among the non-cognitive abilities, openness and extraversion significantly affect job satisfaction at the 5% significance level, while agreeableness significantly affects job satisfaction at the 10% level.

Tables 5 and 6 show that the Big Five personality traits have no significant impact on job-education matching and job-major matching, suggesting that the influence of non-cognitive abilities on these aspects of employment quality among secondary vocational school students is limited.

Table 4: Impact of Non-Cognitive Abilities on Job Satisfaction among Secondary Vocational School Students

	(1)	(2)	(3)	(4)	(5)
Openness	0.0173**				
	(0.00864)				
Conscientiousness		0.0125			
		(0.0100)			
Extraversion			0.0206**		
			(0.00862)		
Agreeableness				0.0183*	
				(0.0102)	
Neuroticism					0.00946
					(0.0111)
Control for Individual Characteristics	YES	YES	YES	YES	YES
Control for Family Background	YES	YES	YES	YES	YES
Control for School Fixed Effects	YES	YES	YES	YES	YES
Observations	644	644	644	644	644
R2	0.063	0.059	0.065	0.062	0.058

Note: * p<0.1, ** p<0.05, *** p<0.01; Standard errors in parentheses.

Table 5: The Impact of Non-cognitive Abilities on Vocational School Students' Job-Education Match

	(1)	(2)	(3)	(4)	(5)
Openness	0.00694				
	(0.0127)				
Conscientiousness		0.0122			
		(0.0143)			
Extraversion			0.0113		
			(0.0124)		

Table 5: Continued

	(1)	(2)	(3)	(4)	(5)
Agreeableness				0.0144	
				(0.0144)	
Neuroticism					0.0107
					(0.0151)
Control for Individual Characteristics	YES	YES	YES	YES	YES
Control for Family Background	YES	YES	YES	YES	YES
Control for School Fixed Effects	YES	YES	YES	YES	YES
Observations	644	644	644	644	644
R2	0.082	0.082	0.082	0.083	0.082

Note: * p<0.1, ** p<0.05, *** p<0.01; Standard errors in parentheses.

Table 6: The Impact of Non-cognitive Abilities on Vocational School Students' Job-Major Match

	(1)	(2)	(3)	(4)	(5)
Openness	0.0124				
	(0.0137)				
Conscientiousness		0.0162			
		(0.0153)			
Extraversion			0.0188		
			(0.0132)		
Agreeableness				0.0104	
				(0.0158)	
Neuroticism					0.00899
					(0.0165)
Control for Individual Characteristics	YES	YES	YES	YES	YES
Control for Family Background	YES	YES	YES	YES	YES
Control for School Fixed Effects	YES	YES	YES	YES	YES
Observations	644	644	644	644	644
R2	0.093	0.094	0.095	0.093	0.092

Note: * p<0.1, ** p<0.05, *** p<0.01; Standard errors in parentheses.

4.3. The Impact of Vocational Skills on Employment Quality of Vocational School Students

The level of students' technical skills is directly linked to their employment rate, serving as an important criterion for vocational school students to secure positions in designated companies and is also one of the key factors in improving school employment rates [62]. This paper analyzes the effects of objective skill dimensions (certificates, competition participation, competition achievement) and subjective skill self-assessment (system analysis, deductive reasoning, oral expression, written comprehension, written expression, mathematical knowledge, data analysis) on the employment quality of vocational school students. All models control for individual characteristics, family background variables, and school fixed effects.

As shown in Table 7, certificates significantly improve job satisfaction at the 5% level and significantly enhance the matching of work with education and major at the 1% level, indicating that certificates still play an effective signaling role for vocational school students when entering the early labor market [63].

Table 7: The Impact of Objective Skill Dimensions on Employment Quality of Vocational School Students

Variable	(1) Job Satisfaction	(2) Job-Education Matching	(3) Job-Major Matching
Skill Certificate	0.196**	0.453***	0.387***
	(0.0907)	(0.131)	(0.140)
Competition Participation	0.00329	-0.0651	0.155
	(0.0805)	(0.111)	(0.121)

Table 7: Continued

Variable	(1) Job Satisfaction	(2) Job-Education Matching	(3) Job-Major Matching
Competition Achievement	0.0423	-0.0902	-0.204
	(0.131)	(0.182)	(0.191)
Control for Individual Characteristics	YES	YES	YES
Control for Family Background	YES	YES	YES
Control for School Fixed Effects	YES	YES	YES
Observations	644	644	644
R^2	0.067	0.084	0.079

Note: * p<0.1, ** p<0.05, *** p<0.01; Standard errors in parentheses.

Due to the potential collinearity among the seven skill characteristics in general abilities, this paper examines their effects individually by incorporating them into regression models. As shown in Table 8, system analysis, deductive reasoning, and oral expression significantly improve job satisfaction at the 1% level, while written comprehension and written expression significantly enhance job satisfaction at the 5% level. Data analysis significantly increases job satisfaction at the 10% level, whereas mathematical knowledge has no significant effect on job satisfaction.

Table 8: The Impact of General Abilities on Job Satisfaction of Vocational School Students

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
System Analysis	0.0935***						
	(0.0285)						
Deductive Reasoning		0.0928**					
		(0.0318)					
Oral Expression			0.110***				
			(0.0349)				
Written Comprehension				0.0707**			
				(0.0309)			
Written Expression					0.0813**		
					(0.0357)		
Mathematical Knowledge						-0.000243	
						(0.0323)	
Data Analysis							0.0512*
							(0.0292)
Control for Individual Characteristics	YES	YES	YES	YES	YES	YES	YES
Control for Family Background	YES	YES	YES	YES	YES	YES	YES
Control for School Fixed Effects	YES	YES	YES	YES	YES	YES	YES
Observations	644	644	644	644	644	644	644
R^2	0.080	0.076	0.080	0.071	0.072	0.063	0.068

Note: * p<0.1, ** p<0.05, *** p<0.01; Standard errors in parentheses.

As shown in Table 9, system analysis, deductive reasoning, oral expression, written expression, mathematical knowledge, and data analysis significantly positively influence job-education match at the 1% level, while written comprehension significantly positively impacts job-education match at the 5% level. This indicates that general skills can to some extent compensate for vocational school students' mismatch between job and education.

Table 9: The Impact of General Abilities on Job-Education Match of Vocational School Students

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
System Analysis	0.143***						
	(0.0380)						
Deductive Reasoning		0.152***					
		(0.0432)					
Oral Expression			0.187***				
			(0.0447)				
Written Comprehension				0.0860**			

Table 9: Continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				(0.0415)			
Written Expression					0.151***		
					(0.0468)		
Mathematical Knowledge						0.154***	
						(0.0427)	
Data Analysis							0.116***
							(0.0407)
Control for Individual Characteristics	YES	YES	YES	YES	YES	YES	YES
Control for Family Background	YES	YES	YES	YES	YES	YES	YES
Control for School Fixed Effects	YES	YES	YES	YES	YES	YES	YES
Observations	644	644	644	644	644	644	644
R^2	0.073	0.071	0.079	0.058	0.068	0.071	0.065

Note: * p<0.1, ** p<0.05, *** p<0.01; Standard errors in parentheses.

As shown in Table 10, system analysis, deductive reasoning, oral expression, written expression, mathematical knowledge, and data analysis significantly improve job-major match at the 1% level, while written comprehension significantly enhances job-major match at the 5% level. This indicates that the cultivation of general skills during high school can effectively enhance job-major match for vocational school graduates.

Table 10: The Impact of General Abilities on Job-Major Match of Vocational School Students

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
System Analysis	0.162***						
	(0.0401)						
Deductive Reasoning		0.217***					
		(0.0454)					
Oral Expression			0.187***				
			(0.0478)				
Written Comprehension				0.0891**			
				(0.0438)			
Written Expression					0.158***		
					(0.0497)		
Mathematical Knowledge						0.162***	
						(0.0460)	
Data Analysis							0.129***
							(0.0432)
Control for Individual Characteristics	YES	YES	YES	YES	YES	YES	YES
Control for Family Background	YES	YES	YES	YES	YES	YES	YES
Control for School Fixed Effects	YES	YES	YES	YES	YES	YES	YES
Observations	644	644	644	644	644	644	644
R^2	0.083	0.093	0.082	0.065	0.074	0.077	0.073

Note: * p<0.1, ** p<0.05, *** p<0.01; Standard errors in parentheses.

5. Conclusion

This study utilized data from a sample survey of graduates from 10 schools participating in the "Win the Future" Phase II project in 2023 and quantitative analysis methods to obtain three main findings. Firstly, vocational school students in the top 25% and 50% of academic rankings demonstrate higher levels of alignment between their jobs and educational background as well as their jobs

and field of study in the labor market. The positive effect of cognitive ability development during high school on the direct employment group's entry into the labor market is commendable. However, the role of mathematics education during high school for the directly employed group in the labor market is limited and even shows a reverse effect, indicating that mathematics education during high school exhibits signs of being out of sync with the labor market to some extent. Secondly, openness, extraversion, and agreeableness in non-cognitive abilities significantly enhance job satisfaction, indicating that enhancing non-cognitive abilities among vocational school students is conducive to improving their performance in the labor market. Thirdly, skills are strongly correlated with job quality, especially certificates in the objective skill dimension, which helps improve the job quality of vocational school graduates. Additionally, certificates and general skills to some extent compensate for the mismatch between vocational school students' work and their educational and professional backgrounds.

The findings of this study have certain policy and practical implications. Firstly, vocational schools need to strengthen the cultivation of cognitive abilities among vocational school students. Cognitive abilities, as an important component of human capital, have positive implications for both the group pursuing further education and the group entering the workforce. Mathematics education needs to be updated and iterated in a timely manner, integrating with the current artificial intelligence revolution, and selecting teaching schemes in mathematics that vocational students can more easily absorb and flexibly apply.

Secondly, in the context of structural identity disputes, insufficient constructive identity recognition, and unstable survival stance in China's vocational education [64], vocational students often face social prejudices [65], which can lead to negative traits such as introversion and low self-esteem. As of 2024, employment pressure still persists, and structural contradictions in employment in certain industries remain relatively prominent [66]. Consequently, vocational graduates are susceptible to experiencing depression and other negative emotions [67]. Openness, extraversion, serving as buffers against stress, coupled with agreeableness representing altruistic thinking, to some extent, help vocational graduates navigate the uncertainty of employment. Vocational schools should encourage vocational students with low scores in openness, extraversion, and agreeableness to actively participate in mock interviews [68] to boost their confidence in job seeking. The roots of contradictions, anxiety, and blind obedience during employment lie in unclear self-awareness leading to undefined employment goals [69]. Therefore, colleges should strengthen vocational guidance courses to clarify career goals [70], enabling vocational graduates to plan their futures early and define their positions.

Thirdly, at the skill level, vocational schools need to enhance the cultivation of students' certificates and general skills. Certificates, as one of the paths for skills development, require vocational schools to strengthen certificate-related teaching resources through teacher training, curriculum content, and pedagogical reform. Furthermore, technological changes have increased the demand for general skills in the labor market [71], particularly in technology-driven fields where the demand for soft skills is particularly pronounced. Critical and analytical thinking, problem-solving abilities, communication skills, and flexible creativity are essential for individuals to thrive in a future characterized by technological advancement [72]. Therefore, vocational schools should intensify the cultivation of students' general skills. The seven abilities of systems analysis, deductive reasoning, oral expression, written comprehension, written expression, mathematical knowledge, and data analysis, as important components of general human capital, can gradually permeate into daily teaching at schools, consciously training students in these abilities.

It is worth noting that while this paper provides evidence of how cognitive abilities, non-cognitive abilities, and skills promote high-quality employment for vocational graduates, caution is warranted in interpreting the results. Firstly, due to the low proportion of the sampled employment group, the sample size and selection have certain limitations, and it cannot be determined whether this conclusion applies to all groups of vocational graduates. The generalizability of the research findings awaits further validation [73]. Secondly, the samples in this study mainly collected the early labor market status of vocational graduates, making it difficult to verify the long-term impact of vocational education on the labor market. Finally, in the selection of indicators for cognitive abilities and job quality, this paper chose academic ranking, learning investment, mathematical scores, and job satisfaction, job-education matching, and job-major matching as measurement indicators, which may be somewhat one-sided. Subsequent research should select more objective and comprehensive measurement indicators.

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