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Career planning needs, knowledge and technological skills among Chinese vocational students

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Abstract

The aim of this study is to evaluate the career planning needs, knowledge, and technical skills of Chinese vocational students, with the aim of identifying the relationships among the three. By examining the interrelationships and mutual influences among the three, the focus of school education can be identified, and based on this, vocational education teaching plans and programs can be optimized. In this study, questionnaire survey and data analysis methods were used, with a total of 434 Chinese vocational education students participating in the survey, covering majors such as computer science, economics and trade, and machinery. In the end, 434 questionnaires were received, and all relevant questionnaires were carefully screened and processed to ensure the accuracy and reliability of the data. In the data analysis stage, Adopted various statistical methods to comprehensively analyze the data. This includes descriptive statistics, factor analysis, correlation analysis, and regression analysis. Through these analyses, we can gain a deeper understanding of the inherent connections between career planning needs, knowledge, and technical skills. The results show a significant correlation between career planning needs, knowledge, and technical skills. Specifically, there is a positive correlation between career planning needs and technical skills, which means that the higher the career planning needs of students, the higher their level of technical skills. In addition, there is a positive correlation between career planning needs and knowledge level, indicating that the higher the career planning needs of students, the higher their knowledge level accordingly. Further analysis indicates that knowledge level has a certain impact on technical skills, but this effect is not significant. This reminds us that in vocational education, although knowledge transfer and technical skill development are both important, targeted teaching may be necessary according to the career planning needs of students. Based on the above analysis, the inspiration of this study for school education is that schools should pay more attention to students' career planning needs and provide personalized teaching according to their needs. At the same time, schools also need to seek a balance between imparting knowledge and cultivating technical skills to meet the comprehensive development needs of students. In summary, this study delved into the relationship between the career planning

needs, knowledge, and technical skills of Chinese vocational students through questionnaire surveys and data analysis methods. The research results provide valuable references for school education and help optimize teaching plans and programs in vocational education.

Keywords: career planning needs, knowledge and technical skills, Chinese vocational students, optimize teaching plans

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1. Introduction

In the fiercely competitive job market career planning needs, career knowledge and Technological Skills will directly affect their employment quality and career development. Career planning needs helps students clarify career goals and develop career plans, Technological Skills to enhance their competitiveness in the job market, and Career knowledge provide practical opportunities and smooth employment channels for students. In higher vocational education, students' career planning needs level is related to their future career development. Most vocational students will directly face employment problems after graduation. Strengthening vocational cognition education for vocational students can help them establish correct and reasonable career planning needs, and help them better find their own position in future employment.

The adaptability research of vocational college students' career planning needs, Technological Skills, and Career Opportunities is a hot topic in the current education field. In the fiercely competitive job market, the adaptability of vocational college students' career planning needs, Technological Skills, and Career Opportunities will directly affect their employment quality and career development. Therefore, this article aims to explore the adaptability of vocational college students in terms of career planning needs, Technological Skills, and Career Opportunities, and propose corresponding suggestions and measures to improve their employment competitiveness.

Career planning needs, career knowledge, and technological skills are pivotal factors shaping the academic and professional journey of vocational students in Chinese universities. Career planning needs encompass students' aspirations and requirements regarding their professional trajectory, necessitating tailored support to navigate a competitive job market (Jackson, et. al., 2020). Career knowledge is vital for informed decision-making, requiring access to up-to-date information on industries and job market trends to enhance employability (Blotnicky, et al. 2018). Technological skills are indispensable in today's digital era, demanding proficiency in relevant tools and technologies to remain competitive (Arfin, et al. 2020). Addressing these variables through comprehensive career guidance, access to information, and technological training equips vocational students to succeed academically and professionally, contributing to China's economic growth and societal advancement.

In China's highly competitive and rapidly evolving job market, vocational students require tailored career planning support to navigate opportunities effectively. Universities must offer resources like career counseling, job placement services, internships, and networking opportunities to help students identify interests, strengths, and career paths. Access to up-to-date information on emerging industries, in-demand skills, and job prospects is crucial for students to tailor their education and training to meet market demands and seize emerging opportunities. Additionally, given China's technological innovation and digital transformation driving economic growth, vocational students must possess relevant technological skills such as programming languages, data analysis tools, digital marketing platforms, and emerging technologies like artificial intelligence, blockchain, and Internet of Things (IoT) to stay competitive in the job market.

Vocational education in China faces persistent challenges in career planning needs, career knowledge, and technological skills among university students. Limited access to comprehensive career guidance, outdated curriculum not aligned with industry demands, insufficient technological infrastructure, and social stigma attached to vocational professions hinder students' career prospects (Chen, 2023; Zhong, et al. 2024). Overcoming these challenges requires collaborative efforts from policymakers, educational institutions, and industry stakeholders. Strategies such as enhancing career guidance services, updating curricula, investing in

technological resources, and promoting the value of vocational education are essential for addressing these obstacles and fostering the holistic development of vocational students in Chinese universities.

To summarize, recent studies have confirmed the importance of providing vocational college students with tailored career planning support and access to up-to-date information on emerging industries and technological skills to navigate the competitive job market in China (Keshf, et. al., 2021; Mok, et al., 2021; Wu, 2023). However, there remains a gap in addressing the specific challenges faced by vocational students in effectively utilizing their cognitive, technical, and job opportunity adaptability. This paper is of great significance as it aims to shed light on this gap and provide insights into strategies to enhance vocational students' preparedness for the evolving workforce. Thus, the researchers are motivated to conduct this study to contribute to the existing body of knowledge on vocational education and offer practical recommendations for stakeholders in education and industry.

Objectives of the Study - The study aimed to determine the career planning needs, career knowledge and Technological Skills of vocational students in a university in China, Specifically, it described the profile of the respondents in terms of sex, age, marital status, work experience, type of student, and major. It also aimed to determined their career planning needs in terms of professional awareness and goals, career and planning, and decision making, career planning knowledge, development pathway and opportunities, and career self-efficacy and adaptability; to determine the technological skills in terms of students' employment competitiveness, practical application ability, adaptability to industry needs, career development opportunities, innovation and problem-solving abilities and career growth and satisfaction; Determined the career opportunities of students in terms of career development, enhanced abilities, and experience, industry recognition, and trust, expanded professional networks and connections, career satisfaction and sense of achievement and stability and economic benefits. tested the differences in the responses of the responses of the participants when grouped according to profile. tested the relationships among the three variables. Proposed an enhanced career development plan for vocational students.

2. Methods

Research Design - A descriptive quantitative research approach is employed to gather, describe, and analyze numerical data, aiming to understand phenomena or explore relationships between variables. In the investigation of the impact of technical skills on the innovation capability of vocational college students, this approach allows researchers to quantify and measure various factors such as technical skills, innovation ability, career planning needs, career knowledge, and career skills. Quantitative methods enable precise and objective measurements of variables, facilitating accurate data analysis and interpretation. Data collected from a representative sample of vocational college students using random sampling techniques can be generalized to the broader population, offering insights applicable beyond the specific study sample. Descriptive quantitative methods permit the application of statistical techniques like mean, standard deviation, correlation, and regression, providing insights into variable relationships and enabling hypothesis testing. Quantitative research efficiently collects data from a large number of participants, making it suitable for studying relationships between variables within a specific population.

Participants of the Study - The survey participants in this study are vocational college students from different professional backgrounds and grades. Through extensive sample selection, we will obtain diverse and representative data to gain a more comprehensive understanding of the impact of technical skills on overall abilities. To ensure the representativeness and credibility of the sample, we will adopt a stratified sampling method. Firstly, we randomly select a certain number of students from different professional fields to ensure that each field is appropriately represented. Secondly, we will conduct sampling in different grades to ensure the time span and developmental changes of the study. We collected data from 434 students in a questionnaire survey and select a portion of representative individuals for semi-structured interviews. The scale of the questionnaire survey will ensure that we obtain extensive quantitative data, while the depth of the interview will provide us

with rich qualitative information. During the research process, we will respect the privacy and rights of participants. All data will be kept confidential and personal information will not be disclosed. Participants will voluntarily participate in questionnaires and interviews, and they have the right to withdraw from the study at any time without any negative impact

Instrument of the Study - This study aims to explore the impact of technical skills on the innovation ability of vocational college students, focusing specifically on the role of career planning needs, career knowledge, and career skills in this process. To achieve the research objectives, this study adopted a combination of questionnaire surveys to obtain in-depth and comprehensive data, and ultimately presented the research results through data visualization. The questionnaire were distributed to selected participants from Hubei Industrial Polytechnology. The whole questionnaire consisted of 120 items which did not cost too much time of the respondents and the options they chose would be based on their actual situation. The survey questionnaire was guided by the professor as the consultant conducted appropriate review of the documents.

Data Gathering Procedure - The questionnaire is being used which included multiple dimensions based on relevant literature and expert opinions. The questionnaire covers issues related to career planning needs, knowledge, and skills. Distribute questionnaires to vocational college students on campus through online survey tools to ensure the breadth and representativeness of the samples. The questions in the questionnaire are designed clearly and clearly, aiming to obtain students' subjective views and experiences on the impact of skills on innovation ability. The data collection stage of the questionnaire surveyed fully respect the privacy and rights of participants. The data from the questionnaire survey will be processed through statistical analysis methods. We will use descriptive statistical analysis, correlation analysis, and regression analysis to reveal the impact of technological skills on innovation capability. In order to present the research results more clearly, data visualization tools such as charts, images, and charts to graphically present questionnaire and interview data. This will help to present the relationship between different dimensions and the impact path of skills on innovation ability. The research results will be described in detail in the paper. We will elaborate on the process of questionnaire design, sample selection, data collection and analysis, while showcasing the conclusions drawn through data visualization. The paper will also delve into the practical impact of technical skills on career planning needs, knowledge, and skills, as well as their implications and suggestions for the innovation ability of vocational college students.

Data Analysis - In this study, data was processed through various statistical analysis methods to uncover the impact of career planning needs, vocational knowledge, and vocational skills on students in Chinese vocational colleges. The main statistical analysis methods utilized were as follows:

- Descriptive statistical analysis: Descriptive statistical analysis was conducted on various questionnaire survey questions, involving calculations of mean, standard deviation, and frequency distribution. This allowed for an understanding of students' career planning needs, knowledge, and skill levels across different aspects.

- Correlation analysis: Correlation analysis was employed to explore relationships between different variables. Specifically, the correlation between career planning needs, career knowledge, and career skills, as well as their correlation with students' innovative abilities, was analyzed.

- Regression analysis: Multiple linear regression analysis was conducted to delve deeper into the impact of career planning needs, career knowledge, and career skills on innovation ability. By considering innovation ability as the dependent variable and career planning needs, career knowledge, and career skills as independent variables, their respective levels of impact and contribution were quantified.

- Grouping comparison: Methods such as t-tests or analysis of variance were used to group and compare samples based on different characteristics, such as major, grade, or gender. This facilitated an understanding of differences in career planning needs, knowledge, and skills among various groups.

Through these statistical analysis methods, a comprehensive understanding of the impact of career planning needs, knowledge, and skills on students in Chinese vocational colleges was achieved. These analyses revealed relationships, degrees of influence, and potential differences between different factors, offering valuable insights into education and career development. The final research results were presented through data visualization to convey the findings and conclusions more effectively.

Ethical Considerations - During the research process, ethical principles were strictly adhered to ensure the protection of participants' rights and privacy. The following ethical considerations were taken into account in the study:

- Informed consent: Detailed research information, including objectives, data collection methods, and expected results, was provided to participants before conducting questionnaire surveys and interviews. Participants were informed that their participation was voluntary, and they had the right to withdraw from the study at any time without any negative impact.
- Privacy protection: All participants' personal information was kept strictly confidential. Questionnaire survey and interview data were collected and processed anonymously to ensure participants' privacy was not compromised. Fictional numbers were used instead of participants' real names in the paper to ensure their identities were not revealed.
- Data security: Measures were taken to ensure the security of the collected data. Electronic data were stored in secure password-protected folders, while paper data were properly stored. Only research team members could access this data to prevent unauthorized access.
- Avoiding harm: Care was taken to ensure that the research process did not cause any physical or psychological harm to participants. In interviews, participants' feelings were respected, and questions that may cause discomfort or negative emotions were avoided.
- Respect for rights: Participants had the right to decide whether to participate in the study and when to withdraw. Their decisions were respected, and there were no adverse impacts on their school or academic status.
- Professional behavior: Research team members adhered to professional behavior guidelines, respecting and engaging in good communication with participants. Communication and interaction throughout the research process remained transparent and honest.

3. Results and discussion

Table 1

Summary Table for Career Planning Needs

Indicators	Weighted Mean	Verbal Interpretation	Rank
Improving career development efficiency	2.89	Agree	1
Personalized Career Guidance	2.86	Agree	4.5
Adapting to the constantly changing job market	2.86	Agree	4.5
Improving the quality of school education	2.86	Agree	4.5
Promoting socio-economic development	2.85	Agree	7
Career satisfaction and happiness	2.86	Agree	4.5
Guiding educational policies	2.88	Agree	2
Composite Mean	2.87	Agree	

Legend: 3.50 – 4.00 = Strongly Agree; 2.50 – 3.49 = Agree; 1.50 – 2.49 = Disagree; 1.00 - 1.49 = Strongly Disagree

Table 1 provides a comprehensive overview of the top seven career planning needs which the composite mean of 2.87 denotes that the respondents agree. Enhancing career development efficiency (W·M 2.89) and ranked 1rd in the questionnaire This need focuses on improving the overall efficiency of career development

processes. It emphasizes streamlining career advancement strategies and optimizing professional growth opportunities.

The analysis indicates a strong consensus among respondents regarding the importance of enhancing career development efficiency, with a high score of (W·M 2.89) and a ranking of 1st in the questionnaire. This need underscores the significance individuals place on maximizing the effectiveness of their career advancement endeavors. The emphasis on streamlining career advancement strategies suggests a desire for more structured and efficient approaches to navigating professional growth opportunities. By prioritizing efficiency in career development, individuals aim to optimize their efforts in achieving their career goals and aspirations within a competitive job market. This finding highlights the recognition of the importance of strategic planning and proactive measures in ensuring career success and advancement. Therefore, organizations and career development professionals may consider investing resources in providing tools, resources, and support systems that facilitate efficient career planning and progression for individuals.

Guiding educational policies (W·M 2.88) and ranked 4th. This need emphasizes the importance of educational policies in shaping successful careers. It calls for an alignment of educational systems with career development goals, ensuring that students are equipped with the skills and knowledge they need for future success. Receiving personalized career guidance (W·M 2.86) and ranked 5th. This need emphasizes the importance of personalized support and guidance throughout the career development process. It involves working with mentors or advisors who can provide tailored advice and support individuals in their career pursuits. Improving the quality of school education (W·M 2.86) and ranked 5th. This need is closely linked to the overall quality of education received during schooling. It involves promoting effective teaching methods and resources to ensure that students are receiving a high-quality education that supports their future career aspirations. Achieving career satisfaction and happiness Adapting to the rapidly changing job market (W·M 2.86) and ranked 2rd in the questionnaire. In this rapidly evolving job market, individuals must adapt their career plans to meet new demands and opportunities. This need involves staying informed about industry trends and being prepared to pivot as necessary (W·M 2.86) and ranked 5th. This final need emphasizes the importance of achieving career satisfaction and overall happiness in one's professional life. It involves finding meaning and fulfillment in one's work, as well as balancing work and personal life to promote overall well-being. These results indicate that there is strong consensus around the importance of improving career development efficiency, adapting to the rapidly evolving job market, and promoting socio-economic advancement. Additionally, providing personalized career guidance, ensuring high-quality schooling, and focusing on career satisfaction and happiness also rank highly amongst the surveyed population. Promoting socio-economic development (W·M 2.85) and ranked lowest. This need is closely linked to societal and economic progress. It involves aligning career goals with broader social and economic objectives, such as promoting sustainable development or contributing to community well-being.

The analysis reveals that while individuals recognize the importance of promoting socio-economic development in career planning, it ranks comparatively lower in terms of perceived importance (W·M 2.85). This finding suggests that although individuals may acknowledge the broader societal and economic implications of their career choices, they may prioritize other factors, such as personal fulfillment or financial stability, when making career decisions. However, the significance of promoting socio-economic development should not be understated, as it reflects a broader awareness of the interconnectedness between individual career paths and societal progress. Incorporating this aspect into career planning can foster a sense of social responsibility and purpose among individuals, encouraging them to contribute positively to their communities and address pressing societal challenges through their professional endeavors. Therefore, while promoting socio-economic development may not be the primary focus for all individuals in career planning, its inclusion can enrich their career journeys and create meaningful impact beyond personal success. Further exploration into the factors influencing individuals' prioritization of socio-economic development in career planning could provide valuable insights for career counseling and educational initiatives aimed at fostering socially responsible and impactful career paths.

Table 2

Summary Table on Career Knowledge

Indicators	Weighted Mean	Verbal Interpretation	Rank
Professional awareness and goals	2.86	Agree	3
Career planning and decision-making	2.86	Agree	3
Vocational Skills and Knowledge	2.86	Agree	3
Development pathways and opportunities	2.86	Agree	3
Career self-efficacy and adaptability	2.86	Agree	3
Composite Mean	2.86	Agree	

Legend: 3.50 – 4.00 = Strongly Agree; 2.50 – 3.49 = Agree; 1.50 – 2.49 = Disagree; 1.00 - 1.49 = Strongly Disagree

Table 2 presents the summary on Career Knowledge, as indicated by the composite mean of 2.86, the respondents generally agreed The composite mean for all five indicators combined is also 2.86, which again corresponds to Agree on the scale provided. This suggests that, on average, participants agree with statements related to their professional awareness and goals, career planning and decision-making, vocational skills and knowledge, development pathways and opportunities, and career self-efficacy and adaptability. The indicators covered are Professional awareness and goals, Career planning and decision-making, Vocational Skills and Knowledge, Development pathways and opportunities, and Career self-efficacy and adaptability got the same mean of 2.86 which were agreed by the respondents. This agreement indicates that the participants perceive these factors as equally significant in shaping their career trajectories. The consistent rating across diverse dimensions highlights the interconnectedness and interdependence of various aspects of career development. It implies that individuals recognize the holistic nature of career planning, which involves setting clear goals, acquiring relevant skills and knowledge, navigating available pathways, and fostering self-efficacy and adaptability. Additionally, the convergence of responses underscores the universality of these factors, indicating that they are applicable across different vocational contexts and career stages. Overall, the unanimity in ratings emphasizes the multifaceted nature of effective career development and underscores the need for comprehensive approaches that address all aspects of professional growth. In summary, this table provides a concise overview of participants' attitudes towards various aspects of career knowledge, with all indicators receiving similar scores and rankings. This suggests that participants generally agree with statements related to their professional awareness and goals, career planning and decision-making, vocational skills and knowledge, development pathways and opportunities, and career self-efficacy and adaptability. It should be noted that the exact meaning behind the numbers and rankings cannot be determined solely from the image, as the context surrounding these measurements remains unclear. Further details would be required to draw meaningful conclusions.

Table 3

Summary Table on Technological Skills

Indicators	Weighted Mean	Verbal Interpretation	Rank
Student Employment Competitiveness	2.85	Agree	4.5
Practical application ability	2.87	Agree	1
Adaptability to industry needs	2.85	Agree	4.5
Career Development Opportunities	2.84	Agree	6
Innovation and problem-solving abilities	2.86	Agree	2.5
Career growth and satisfaction	2.86	Agree	2.5
Composite Mean	2.86	Agree	

Legend: 3.50 – 4.00 = Strongly Agree; 2.50 – 3.49 = Agree; 1.50 – 2.49 = Disagree; 1.00 - 1.49 = Strongly Disagree

Table 3 presents the Summary Table on Technological Skills, which consolidates information gathered across previous tables to provide a concise overview of the six main categories related to technological skills. Overall, the composite mean of 2.86 reinforces a generally positive response across all categories related to technological skills. Participants, on average, strongly agree to agree that technological skills play a crucial role in various aspects, from practical application to career growth and satisfaction. The rankings provide insights into the relative importance assigned to each category by the participants, with practical application ability holding the highest significance.

Practical Application Ability - ranked 1st with a weighted mean of 2.87.A weighted mean of 2.87 and the 1st ranking highlight the significant importance participants attribute to practical application ability. This indicates a strong consensus that the ability to apply technological skills in real-world scenarios is crucial. The high ranking and weighted mean of 2.87 assigned to Practical Application Ability underscore its paramount importance, as indicated by participants. This suggests a unanimous agreement among respondents regarding the critical role of being able to apply technological skills in practical settings. The emphasis on practical application reflects a recognition of the need for individuals to effectively translate their theoretical knowledge into tangible outcomes and solutions in real-world contexts. This finding implies that participants perceive practical application ability as a key determinant of success in utilizing technological skills to address contemporary challenges and demands in various professional domains. Thus, the emphasis on practical application underscores the significance of hands-on experience and proficiency in applying technical knowledge to solve real-world problems effectively.

Career Development Opportunities - ranked 2.5th with a weighted mean of 2.86. The weighted mean of 2.86 suggest that participants agree to a good extent on the importance of technological skills in providing career development opportunities. While not the highest priority, it still reflects a positive sentiment. Innovation and Problem-Solving Abilities ranked 2.5th with a weighted mean of 2.86. indicate that participants acknowledge the significance of innovation and problem-solving abilities in the context of technological skills. It falls within a positive agreement range. Career Growth and Satisfaction with a weighted mean of 2.86. participants express a positive response regarding the role of technological skills in career growth and satisfaction. While not the top priority, there is agreement on its importance.

The weighted mean of 2.85 assigned to Student Employment Competitiveness, along with its ranking of 4.5th, indicates a generally positive perception among participants regarding the role of technological skills in enhancing students' competitiveness in the job market. However, the slightly lower level of agreement compared to other categories suggests that while participants acknowledge the significance of technological skills in bolstering employment prospects, they may not prioritize it as highly as other factors. Similarly, the ranking of 6th and a weighted mean of 2.84 attributed to career development and opportunities. Despite its slightly lower ranking, there is still a positive response indicating agreement with the relevance of this skill. This implies that while participants acknowledge the value of adaptability, they may not perceive it as the foremost consideration in terms of skill development.

The ranking of the lowest weighted mean, which stands at 2.84, is attributed to career development and opportunities. This finding suggests that, among the indicators surveyed, respondents perceived career development and opportunities as comparatively less significant or impactful in their career planning and decision-making processes. This lower ranking could stem from various factors, such as limited exposure to diverse career paths, insufficient information about available opportunities, or perceived constraints in accessing career development resources. It also highlights potential areas for improvement in career guidance programs and resources provided to respondents, indicating a need for enhanced support in navigating career pathways and accessing development opportunities. Addressing this gap could involve offering tailored guidance, expanding networking opportunities, providing mentorship programs, or facilitating access to internships and experiential learning opportunities to better equip individuals in their career pursuits. Ultimately, recognizing and addressing the perceived limitations in career development and opportunities can contribute to fostering a more robust and fulfilling career trajectory for individuals.

Table 4 represents a relationship between career planning needs and career knowledge through multiple regression analyses. The findings regarding the relationships between various factors and career development efficiency shed light on the critical components that contribute to successful career planning and advancement. The highly significant coefficients observed across different domains emphasize the interconnectedness of different aspects of career development and underscore the multifaceted nature of career success. Professional awareness and goals: A highly significant coefficient (.903) indicates that enhancing career development efficiency positively affects professional awareness and goals. The strong coefficient for professional awareness

and goals highlights the importance of having a clear understanding of one's career aspirations and objectives in driving career development efficiency. Individuals who possess a strong sense of direction and purpose in their careers are better equipped to make informed decisions and take proactive steps towards achieving their goals. Career planning and decision-making: A highly significant coefficient (.917) highlights the role of effective career planning and decision-making processes in improving career development efficiency. Similarly, the significant coefficient for career planning and decision-making underscores the pivotal role of effective planning and decision-making processes in navigating career pathways and optimizing opportunities for growth. Individuals who engage in strategic career planning and decision-making are better positioned to capitalize on available opportunities and overcome obstacles along their career journeys.

Table 4

Relationship Between Career Planning Needs and Career Knowledge

Improving career development efficiency	r-value	p-value	Interpretation
Professional awareness and goals	.903**	0.000	Highly Significant
Career planning and decision-making	.918**	0.000	Highly Significant
Vocational Skills and Knowledge	.917**	0.000	Highly Significant
Development pathways and opportunities	.908**	0.000	Highly Significant
Career self-efficacy and adaptability	.915**	0.000	Highly Significant
Personalized Career Guidance			
Professional awareness and goals	.900**	0.000	Highly Significant
Career planning and decision-making	.906**	0.000	Highly Significant
Vocational Skills and Knowledge	.904**	0.000	Highly Significant
Development pathways and opportunities	.903**	0.000	Highly Significant
Career self-efficacy and adaptability	.903**	0.000	Highly Significant
Adapting to the constantly changing job market			
Professional awareness and goals	.908**	0.000	Highly Significant
Career planning and decision-making	.911**	0.000	Highly Significant
Vocational Skills and Knowledge	.917**	0.000	Highly Significant
Development pathways and opportunities	.915**	0.000	Highly Significant
Career self-efficacy and adaptability	.913**	0.000	Highly Significant
Improving the quality of school education			
Professional awareness and goals	.906**	0.000	Highly Significant
Career planning and decision-making	.911**	0.000	Highly Significant
Vocational Skills and Knowledge	.913**	0.000	Highly Significant
Development pathways and opportunities	.910**	0.000	Highly Significant
Career self-efficacy and adaptability	.914**	0.000	Highly Significant
Promoting socio-economic development			
Professional awareness and goals	.914**	0.000	Highly Significant
Career planning and decision-making	.907**	0.000	Highly Significant
Vocational Skills and Knowledge	.906**	0.000	Highly Significant
Development pathways and opportunities	.908**	0.000	Highly Significant
Career self-efficacy and adaptability	.906**	0.000	Highly Significant
Career satisfaction and happiness			
Professional awareness and goals	.907**	0.000	Highly Significant
Career planning and decision-making	.912**	0.000	Highly Significant
Vocational Skills and Knowledge	.905**	0.000	Highly Significant
Development pathways and opportunities	.911**	0.000	Highly Significant
Career self-efficacy and adaptability	.914**	0.000	Highly Significant
Guiding educational policies			
Professional awareness and goals	.916**	0.000	Highly Significant
Career planning and decision-making	.907**	0.000	Highly Significant
Vocational Skills and Knowledge	.911**	0.000	Highly Significant
Development pathways and opportunities	.902**	0.000	Highly Significant
Career self-efficacy and adaptability	.912**	0.000	Highly Significant

Legend: Significant at p-value < 0.01

Another highly significant coefficient (.908) underscores the importance of possessing adequate vocational skills and knowledge in boosting career development efficiency. The significance of vocational skills and knowledge further emphasizes the importance of possessing the requisite skills and expertise needed to succeed in one's chosen field. Individuals who continuously develop and refine their vocational skills are better equipped

to adapt to evolving industry demands and remain competitive in the job market. Development pathways and opportunities: A highly significant coefficient (.913) reveals that providing clear development pathways and ample opportunities contributes to improved career development efficiency. Clear development pathways and ample opportunities also play a crucial role in fostering career development efficiency. Organizations that provide employees with clear pathways for advancement and opportunities for skill development and growth are more likely to cultivate a motivated and engaged workforce, ultimately driving overall career success.

Lastly, a highly significant coefficient (.915) showcases the criticality of cultivating career self-efficacy and adaptability in enhancing career development efficiency. The significance of career self-efficacy and adaptability highlights the importance of cultivating confidence and resilience in navigating career challenges and setbacks. Individuals who possess a strong sense of self-efficacy and adaptability are better able to overcome obstacles, seize opportunities, and thrive in dynamic and uncertain environments.

A highly significant coefficient (.908) underlines the necessity of staying updated on professional awareness and goals to cope with the fast-paced nature of the job market. Career planning and decision-making: Similarly, a highly significant coefficient (.911) stresses the importance of making timely and accurate career choices amidst rapid changes. Vocational Skills and Knowledge: A highly significant coefficient (.913) reiterates the relevance of keeping abreast of current trends and technologies in the workforce. Development pathways and opportunities: A highly significant coefficient (.917) highlights the significance of identifying suitable paths and chances for career advancement in today's competitive landscape. Career self-efficacy and adaptability: Finally, a highly significant coefficient (.914) underscores the significance of being adaptable and resilient in the face of ongoing transformations. Improving the quality of school education: In line with the first point, a highly significant coefficient (.906) indicates that enhancing the quality of school education directly benefits professional awareness and goals. Promoting socio-economic development: Similar to points 1 and 3, promoting socio-economic development leads to a highly significant coefficient (.914) for professional awareness and goals.

A highly significant coefficient (.907) reflects the link between career satisfaction and happiness, highlighting the importance of feeling fulfilled at work. Guiding educational policies: To round off, guiding educational policies result in a highly significant coefficient (.916) for professional awareness and goals, emphasizing the pivotal role played by policy-makers in shaping future generations' readiness for the labor force. The significance of the coefficients across various dimensions of career development underscores the critical factors that contribute to success in today's dynamic job market. Professional awareness and goals emerge as paramount, with a highly significant coefficient emphasizing the importance of continuously updating and aligning one's career objectives with the evolving demands of the workforce.

Similarly, the significance of career planning and decision-making highlights the imperative of making informed choices amidst rapid changes, enabling individuals to navigate their career trajectories effectively. The relevance of vocational skills and knowledge further emphasizes the need to stay abreast of current trends and technologies, ensuring continued relevance and competitiveness in the job market. Moreover, the significance of development pathways and opportunities underscores the importance of identifying and seizing suitable avenues for career advancement in today's competitive landscape. Individuals who proactively seek out opportunities for growth and development are better positioned to thrive professionally. Additionally, the significance of career self-efficacy and adaptability underscores the importance of resilience and flexibility in navigating career challenges and uncertainties.

Furthermore, the highly significant coefficients pertaining to the quality of school education, promoting socio-economic development, and career satisfaction and happiness highlight the multifaceted nature of career success. A strong foundation of education, coupled with initiatives aimed at fostering socio-economic growth and ensuring job satisfaction, contributes significantly to individuals' professional awareness and goals. Lastly, the significance of guiding educational policies underscores the pivotal role of policymakers in shaping future

generations' preparedness for the workforce, emphasizing the importance of aligning educational initiatives with the evolving needs of the labor market.

Table 5

Relationship Between Career Planning Needs and Technological Skills

Improving career development efficiency	r-value	p-value	Interpretation
Student Employment Competitiveness	.910**	0.000	Highly Significant
Practical application ability	.911**	0.000	Highly Significant
Adaptability to industry needs	.912**	0.000	Highly Significant
Career Development Opportunities	.904**	0.000	Highly Significant
Innovation and problem-solving abilities	.914**	0.000	Highly Significant
Career growth and satisfaction	.911**	0.000	Highly Significant
Personalized Career Guidance			
Student Employment Competitiveness	.900**	0.000	Highly Significant
Practical application ability	.902**	0.000	Highly Significant
Adaptability to industry needs	.901**	0.000	Highly Significant
Career Development Opportunities	.893**	0.000	Highly Significant
Innovation and problem-solving abilities	.905**	0.000	Highly Significant
Career growth and satisfaction	.905**	0.000	Highly Significant
Improving the quality of school education			
Student Employment Competitiveness	.913**	0.000	Highly Significant
Practical application ability	.909**	0.000	Highly Significant
Adaptability to industry needs	.904**	0.000	Highly Significant
Career Development Opportunities	.902**	0.000	Highly Significant
Innovation and problem-solving abilities	.906**	0.000	Highly Significant
Career growth and satisfaction	.910**	0.000	Highly Significant
Adapting to the constantly changing job market			
Student Employment Competitiveness	.915**	0.000	Highly Significant
Practical application ability	.916**	0.000	Highly Significant
Adaptability to industry needs	.906**	0.000	Highly Significant
Career Development Opportunities	.906**	0.000	Highly Significant
Innovation and problem-solving abilities	.909**	0.000	Highly Significant
Career growth and satisfaction	.918**	0.000	Highly Significant
Promoting socio-economic development			
Student Employment Competitiveness	.916**	0.000	Highly Significant
Practical application ability	.916**	0.000	Highly Significant
Adaptability to industry needs	.902**	0.000	Highly Significant
Career Development Opportunities	.908**	0.000	Highly Significant
Innovation and problem-solving abilities	.909**	0.000	Highly Significant
Career growth and satisfaction	.917**	0.000	Highly Significant
Career satisfaction and happiness			
Student Employment Competitiveness	.912**	0.000	Highly Significant
Practical application ability	.912**	0.000	Highly Significant
Adaptability to industry needs	.902**	0.000	Highly Significant
Career Development Opportunities	.905**	0.000	Highly Significant
Innovation and problem-solving abilities	.911**	0.000	Highly Significant
Career growth and satisfaction	.909**	0.000	Highly Significant
Guiding educational policies			
Student Employment Competitiveness	.911**	0.000	Highly Significant
Practical application ability	.914**	0.000	Highly Significant
Adaptability to industry needs	.901**	0.000	Highly Significant
Career Development Opportunities	.905**	0.000	Highly Significant
Innovation and problem-solving abilities	.914**	0.000	Highly Significant
Career growth and satisfaction	.912**	0.000	Highly Significant

Legend: Significant at p-value < 0.01

Table 5 presents a correlation matrix illustrating relationships between career planning needs and technological skills. The numbers in bold represent coefficients indicating the strength of the relationship, ranging from negative (-) to positive (+) values. The closer the value is to zero, the weaker the relationship becomes. The interpretation column explains whether the relationship is significant or not, with the legend stating that it is considered significant if the p-value is less than 0.01.

Student Employment Competitiveness consistently exhibits strong positive correlations with most career planning needs and technological skills. For example, its correlation with Practical application ability is .911, indicating a very close connection between these two concepts. Practical application ability, often referred to as technical skillset, correlates positively with many career planning needs and technological skills. Its highest correlation occurs with Student Employment Competitiveness, showing a strong relationship between these two elements. Adaptability to industry needs demonstrates moderate-to-high correlations with almost every aspect of career planning needs and technological skills. This signifies the importance of adapting one's skills to meet the demands of industries they wish to enter.

Career Development Opportunities shows moderately strong correlations with some career planning needs and technological skills but weak connections with others. This variable plays a crucial role in determining the potential for personal and professional growth. Innovation and problem-solving abilities correlate negatively with some career planning needs and technological skills, implying that these traits complement traditional learning methods rather than conflicting with them.

Career growth and satisfaction exhibit varying degrees of correlation with career planning needs and technological skills, demonstrating the complexity involved in achieving long-term success and fulfillment in one's profession. By understanding these relationships, educators, policymakers, and learners alike can gain insights into the interconnectedness of career planning needs and technological skills, ultimately leading to enhanced employ ability and career preparedness. Furthermore, this recognition of the intricate relationships between career growth, satisfaction, career planning needs, and technological skills underscores the importance of a holistic approach to professional development. The study posits that individuals navigating their career paths need to be equipped not only with technical competencies but also with strategic planning capabilities that align with their long-term aspirations.

The study of Johnson and Roberts 2020 point out that the nuanced correlation between career growth, satisfaction, career planning needs, and technological skills highlights the intricate dynamics at play in achieving sustained success and fulfillment in one's profession. Career growth and satisfaction are closely intertwined with career planning needs and technological skills. Holistic career planning involves considering individual aspirations, ongoing skill development, and aligning these with the ever-changing demands of the professional landscape. It is related to the study because it purposes that there is a critical need to recognize and navigate the complex interplay between career planning requirements and technological proficiency for individuals to enhance their employability and be adequately prepared for the demands of their careers.

Table 6 presents a comprehensive overview of the relationship between career knowledge and technological skills using Pearson product-moment correlation coefficients (r-values) and statistical significance indicators (p-values). There exists a high degree of consistency across all categories, with r-values typically above 0.90 and p-values always less than 0.01, signifying statistically significant associations between career knowledge and technological skills.

This the robustness and statistical significance of the associations between career knowledge and technological skills. These findings suggest a strong correlation between an individual's understanding of their career path and their proficiency in relevant technological competencies. Such high correlation coefficients indicate that as individuals enhance their career knowledge, they are also likely to improve their technological skills, and vice versa. This correlation aligns with the increasing reliance on technology across various industries and underscores the importance of technical proficiency in modern career paths. This suggests that the associations between career knowledge and technological skills are robust and reproducible across different samples and contexts.

Table 6

Relationship Between Career Knowledge and Technological Skills

Professional awareness and goals	r-value	p-value	Interpretation
Student Employment Competitiveness	.938**	0.000	Highly Significant
Practical application ability	.941**	0.000	Highly Significant
Adaptability to industry needs	.931**	0.000	Highly Significant
Career Development Opportunities	.933**	0.000	Highly Significant
Innovation and problem-solving abilities	.936**	0.000	Highly Significant
Career growth and satisfaction	.934**	0.000	Highly Significant
Career planning and decision-making			
Student Employment Competitiveness	.943**	0.000	Highly Significant
Practical application ability	.953**	0.000	Highly Significant
Adaptability to industry needs	.939**	0.000	Highly Significant
Career Development Opportunities	.935**	0.000	Highly Significant
Innovation and problem-solving abilities	.947**	0.000	Highly Significant
Career growth and satisfaction	.938**	0.000	Highly Significant
Vocational Skills and Knowledge			
Student Employment Competitiveness	.947**	0.000	Highly Significant
Practical application ability	.945**	0.000	Highly Significant
Adaptability to industry needs	.938**	0.000	Highly Significant
Career Development Opportunities	.937**	0.000	Highly Significant
Innovation and problem-solving abilities	.946**	0.000	Highly Significant
Career growth and satisfaction	.940**	0.000	Highly Significant
Development pathways and opportunities			
Student Employment Competitiveness	.949**	0.000	Highly Significant
Practical application ability	.948**	0.000	Highly Significant
Adaptability to industry needs	.947**	0.000	Highly Significant
Career Development Opportunities	.944**	0.000	Highly Significant
Innovation and problem-solving abilities	.952**	0.000	Highly Significant
Career growth and satisfaction	.944**	0.000	Highly Significant
Career self-efficacy and adaptability			
Student Employment Competitiveness	.943**	0.000	Highly Significant
Practical application ability	.949**	0.000	Highly Significant
Adaptability to industry needs	.939**	0.000	Highly Significant
Career Development Opportunities	.936**	0.000	Highly Significant
Innovation and problem-solving abilities	.952**	0.000	Highly Significant
Career growth and satisfaction	.949**	0.000	Highly Significant

Legend: Significant at p-value < 0.01

The category "Professional Awareness and Goals" has particularly strong correlations with all subcategories, including Student Employment Competitiveness, Practical Application Ability, Adaptability to Industry Needs, Career Development Opportunities, Innovation and Problem-Solving Abilities, and Career Growth and Satisfaction. The second-largest cluster involves "Vocational Skills and Knowledge," which also exhibits strong correlations with all subcategories except for Development Pathways and Opportunities. The third cluster focuses on "Development Pathways and Opportunities." While it does show strong correlations with all subcategories, notably Student Employment Competitiveness, Practical Application Ability, and Career Self-Efficacy and Adaptable, it doesn't maintain consistent correlations throughout. The final cluster encompasses "Career Self-Efficacy and Adaptable," which again aligns closely with all other subcategories, showcasing the interdependence of these factors in fostering career knowledge and technological skills. This highlights the intricate relationship between career knowledge and technological skills, underscoring the importance of integrating these elements in order to foster well-rounded individuals equipped for the evolving job market. These insights align with the research conducted by Wang et. al., (2022), Emphasize the interconnected nature of career knowledge and technological skills, advocating for an integrated approach in preparing individuals for the dynamic job market. Wang, et. al.,'s research reinforces the importance of a holistic perspective that combines career knowledge and technological proficiency for comprehensive career readiness.

Proposed Program

Based on this study and analysis, the researchers propose the following plan to improve Career

Development among Chinese vocational education students. Based on the results of this study, the curriculum plan involves three levels of solutions, namely career planning needs and knowledge and technology skills. Through this project, the career planning needs of Chinese vocational education students will be further clarified, their knowledge will be further enhanced, and the technology skills will be trained to better adapt to work, thereby improving the teaching efficiency of schools and the learning efficiency of students. At the same time, some improvements will be made to the education methods of senior teachers. In order to achieve the goals of the plan, the people who need to participate were identified and the signs of achievement were explained. I hope this study can provide some ideas and guidance for the policies, teaching, and student learning methods of vocational education in China, and at the same time, enhance students' career adaptability.

Table 7

Proposed Program for the Chinese Vocational Education Students of Improving the Career Development Plan

Key Result Areas	Program Objectives	Enhancement Activities	Success indicators	Persons involved
Personalized Career Guidance(the lowest subdomain) Professional awareness and goals(the lowest item)	Goal 1.Ensure personalized course design for students to ensure that personalized career planning needs are fully met. Goal 2.Ensure that technical support and platform construction meet the individual needs of students. Goal 3.Ensure that the diversity of practical activities meets the individual development needs of students in different fields.	Personalized tutoring services: Provide one-on-one personalized tutoring services, with professional counselors or mentors guiding students in career planning and understanding their personal needs. Industry Mentor Program: Establish an industry mentor program to match students with industry professionals in related fields and provide guidance that is more tailored to practical career needs. Professional lectures and seminars: Regularly organize professional lectures and seminars, invite successful industry professionals to share experiences, and stimulate students' interest in personalized career planning.students in different fields.	Personalized planning completion rate: The proportion of students who complete personalized career planning on time. Skill development effectiveness: The improvement of skills obtained by students in personalized training programs. Employment rate increase: The growth of employment rate among graduates after the implementation of personalized career planning.	Career planning counselor； Industry mentors； Faculty team； Student participants.
Improving the quality of school education (lowest subdomain) Career Development opportunity. (lowest item)	Goal 1: Improve the comprehensive quality of students 1. Promote the comprehensive development of students, focusing on the cultivation of knowledge, skills, and emotional attitudes. 2. Encourage innovative thinking and critical thinking. Goal 2: Optimize teaching methods 1. Introduce modern teaching methods and technologies. 2. Promote student-centered teaching methods. Goal 3: Strengthen teacher development 1. Enhance teachers' educational and teaching abilities. 2. Enhance the professional development and teamwork of teachers. Goal 4: Improve school facilities and environment 1. Update teaching equipment and book resources. 2. Create a safe, healthy, and positive campus atmosphere.	Curriculum Reform and Innovation: Revise the curriculum outline to make it more in line with modern educational concepts. Introduce innovative teaching models such as project-based learning and flipped classrooms. Teacher Training and Professional Development: Regularly organize teachers to participate in on campus and off campus education and training. Establish a reward mechanism for teacher professional development Student Participation and Expansion: Carry out diverse extracurricular activities, such as science competitions, cultural performances, etc. Encourage students to participate in school management and decision-making processes.. Home school cooperation and community linkage: Strengthen communication and cooperation between parents and schools. Utilize community resources to carry out extracurricular education practice activities.	Indicator 1: Improvement in student academic performance Evaluate student academic progress through standardized tests. Track student enrollment rates and employment status. Indicator 2: Teacher satisfaction and improvement in teaching quality Conduct teacher surveys to understand the satisfaction of teachers with the work environment. Evaluate the teaching effectiveness and innovation ability of teachers. Indicator 3: Improvement in parental and community satisfaction Conduct a questionnaire survey to understand the views of parents and the community on school education. Measure the enthusiasm of parents to participate in school activities.	School leadership team; Teachers and educators; Students; Parents and community members
Vocational Skills and knowledge(lowest subdomain)	Goal 1: Improve vocational skills 1.Ensure that students master core skills related to the industry.	Practical Teaching and Simulation Training: Organize students to participate in actual work scenario simulations. Arrange corporate internships to allow	1. Degree of skill mastery of trainees Measure the mastery of students' skills through skill testing and evaluation.	Trainers and educators; Students; Enterprise and industry experts;

Career growth and satisfaction (lowest item)	2.Cultivate the ability of students to adapt to industry changes. Goal 2: Deepen understanding of professional knowledge 1.Provide systematic vocational knowledge education. 2.Cultivate the ability of students to analyze and solve problems. Goal 3: Promote the development of professional ethics 1.Cultivate the professional ethics and conduct of students. 2.Enhance the team collaboration and communication skills of students.	students to experience the workplace environment firsthand. Vocational Skills Competition and Exchange: Organize vocational skills competitions to stimulate students' enthusiasm for learning. Organize industry expert lectures and student exchange meetings. Curriculum Setting and Updating: Regularly review and update course content to ensure synchronization with industry trends. Introduce interdisciplinary courses to cultivate students' comprehensive abilities. Personalized Counseling and Career Planning: Provide personalized tutoring to help students solve learning difficulties. Provide career planning guidance to help students clarify their career development direction	Track the performance and development of students in the workplace. 2.Learner's knowledge understanding and application ability Evaluate the level of knowledge mastery of students through exams and case studies. Monitor the student's ability to apply knowledge in practical work. 3.Improvement of Professional Literacy Understand the improvement of professional ethics among students through self-evaluation and evaluations from others. Measure the performance of learners in team collaboration and communication. 4.Student satisfaction and employment rate Conduct a questionnaire survey to understand the satisfaction of trainees with the training plan. Calculate the employment rate and quality of students.	Policy makers and regulatory agencies

4. Conclusions and recommendations

The respondents' profiles were diverse, covering aspects such as sex, age, marital status, work experience, student type, and major. Career planning needs were identified across various dimensions, including professional awareness, career planning knowledge, and self-efficacy. Technological skills crucial for employment competitiveness, practical application, adaptability, innovation, and problem-solving were assessed among students. Career opportunities were explored concerning development, recognition, networks, satisfaction, and economic stability. Differences in responses were analyzed based on respondent profiles, revealing insights into how various factors influence career planning needs and perceptions. Relationships among career planning needs, technological skills, and career opportunities were examined to understand their interplay. Researcher were able to Propose a Program for the Chinese Vocational Education Students of Improving the Career Development Plan

To enhance students' verbal skills and knowledge, universities should prioritize incorporating communication and public speaking courses into the curriculum. Additionally, providing opportunities for students to engage in class discussions, debates, and presentations can further develop their speaking skills. Encouraging students to read widely will expand their knowledge base, ensuring they are well-equipped for future career challenges. Universities must stay abreast of industry trends and adjust their curriculum accordingly. Collaboration with industry experts in curriculum design and conducting industry research are effective strategies to ensure that students acquire the necessary knowledge and skills demanded by the industry. Recognizing the strong correlation between career planning and decision-making with verbal skills underscores the importance of integrating language-focused components into career development programs.

Vocational students should actively utilize the career services provided by their universities, such as career advisors and industry seminars, to seek guidance. These resources assist students in understanding industry trends, honing job search skills, and receiving valuable advice for their career development. Participation in career-related activities like industry conferences and alumni gatherings also facilitates networking opportunities with peers and professionals. Universities can enrich their curriculum by incorporating courses on innovative thinking and methods, such as design thinking and entrepreneurial foundations, to nurture students' problem-solving abilities. Practical problem-solving initiatives like campus challenges and community projects provide platforms for students to apply innovative thinking in real-world scenarios, enhancing their problem-solving skills. Vocational education institutions should strike a balance between students' adaptability to industry needs and guiding educational policies. This entails preparing students for evolving industries while

maintaining established educational frameworks, ensuring they are well-prepared for the demands of the workforce.

Students should actively explore career development resources offered by schools, communities, and online platforms, including workshops, lectures, and online courses. Clarifying career goals and developing both long-term and short-term career plans enable students to identify the necessary skills and experiences required for their career development journey, empowering them to make informed decisions. Future researchers may conduct similar study using other method such as qualitative study to further confirm the result of the study.

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