Optimizing Employment Quality of College Engineering Students: The Crucial Role of School-Based Career Guidance and Readiness

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Abstract: This is a traditional paper that explores the evolving industrial structure's increasing demand for technical talents against the backdrop of economic globalization, posing challenges to the employment prospects of college engineering students. This study delves into how school-based career guidance and services enhance students' career readiness and impact their employment quality. The findings emphasize the critical role of these services in equipping students with job market knowledge, bolstering their search skills and confidence. A positive correlation between career readiness and employment quality is observed, indicating that prepared students secure better jobs. The guidance and services lay a solid foundation for students' employment quality. Finally, practical issues and suggestions in training the employability and career readiness of engineering students are discussed, providing insights for forging the bridge between career guidance and employment quality.

Keywords: college engineering students; career guidance and services; career readiness; employment quality.

1. Introduction

1.1 Research Background

Nowadays digital economy has become the main economic form after agricultural economy and industrial economy (Han & Song, 2023), significantly affecting the industrial structure and the employment structure (Li & Yang, 2018). In terms of industrial structure, the development of the digital economy has greatly reduced the proportion of the secondary industry (Ye, 2021) and increased the proportion of the tertiary industry (Qi, 2020; Han & Song, 2023), especially knowledge-intensive and technology-intensive business service. In 2022, the secondary industry accounts for 39.9% of GDP and the tertiary industry accounts for 52.8% of GDP. In terms of employment structure, the development of the digital economy promote the growth of total employment (Lian & Xie, 2024), and improves the quality of employment (Han & Song, 2023; Zhang & Xin, 2024). Due to the lack of knowledge reserves and technical learning, low-skilled workers will finally be replaced by middle-high skilled

workers (Li & Yang, 2018).

To sum up, the world is in the midst of a new scientific and technological revolution based on the digital technology and artificial intelligence, which brings about the adjustment of economic structure and the transformation of the labor market. On the one hand, it increases the demand for technical talents and provides more opportunities, especially for engineering students. On the other hand, it also brings great challenges to them. Therefore, how to promote engineering graduates' employment quality has become one of the most important issues.

Engineering education in colleges and universities assumes the important task of training engineering science and technology talents, and plays an extremely important role in promoting future scientific technological innovation and long-term sustainable economic development. Therefore, it is imperative to seize the new round of industrial innovation and development opportunities, actively promote the reform of engineering education, focus on the paradigm transformation of engineering education itself and the transformation of training mode.

The employment opportunities for college engineering students are closely linked to societal demand and the effectiveness of the college's personnel training process. Enhancing this training process is crucial for improving the employment quality of these students, whether it involves implementing strategies in response to the new industrial revolution or addressing the current gap between supply and demand for engineering talent. In this context, career guidance, as one of the most common means for colleges and universities to improve college students' employment situation, plays a vital role as a bridge between academic training and professional opportunities, bridging the gap between academic knowledge and practical experience. Through this guidance, it is possible to shape the employment quality and future success of college engineering students, providing a clear pathway from academic knowledge to practical experience.

2. Literally Review

2.1 Employment Quality

Researches on the concept of employment quality could be divided into three interpretation level. Firstly, in the micro level, employment quality includes the work efficiency, salary, the match between the employee and the position, and so on. Secondly, in the middle level, employment quality mainly covers the operation of the labor market and the efficiency of resource allocation. Thirdly, in the macro level, based on the concept of decent work proposed by the International Labor Organization (ILO), which focuses on the quality of employment, the concept of employment quality refers to individuals' right to sustainable and productive job opportunities in conditions

of freedom, equality, security, and human dignity.

Since then, institutions and scholars have actively explored and constructed a series of employment quality evaluation index systems according to the definition of employment quality of the International Labor Organization, which is used to evaluate the level of employment quality. For example, Richard Anker (2002) proposed 11 kinds of decent labor measurement indicators, and Florence Bonnet (2003) proposed 7 measurement indexes, including labor market security, employment security, job security, labor security, reproduction skills security, income security, and voice security. The measurement model of decent labor index is established by using the extreme value method without dimension.

Chinese scholars, such as Liu Suhua (2005), believe that the quality of employment refers to the comprehensive category of the degree of merit of workers in the whole process of employment, combined with the means of production and obtaining labor remuneration or income. Li Junfeng (2003) also admitted that the quality of employment refers to the availability of employment opportunities, job stability, working environment conditions, as well as comprehensive satisfaction such as personal income and development. With the changes in the employment rate of vocational college graduates and higher quality requirements, the focus of the graduate group has shifted from simply finding a job to considering employment quality. Therefore, employment quality is a reflection of problems in the field of employment quality, which includes subjective and objective aspects. From a subjective perspective, employment quality refers to individual workers' subjective satisfaction with their work, including the pleasure and social identity brought by work. It also refers to what kind of job individual workers hope to find and the subjective psychological differences between jobs (International Labour Organization [ILO], 2009). Objectively speaking, it is a kind of social evaluation of workers' work, including labor compensation, welfare benefits, promotion opportunities, and career development. Employment quality in this paper reflects vocational college graduates' ability to realize self-value and get a better life as a set of elements. It includes compensation, working conditions, career development, and other aspects.

In terms of employment quality index, most scholars usually examine the employment quality of colleage graduates from these aspects: the starting salary (Qin, 2007; Yue, 2023); the direction of graduats' post-graduation; resume acceptance (Wang, 2024;); job satisfaction (Yue, 2023). In terms of employment quality factors, most researches analyse the effect of human capital and social capital to the employment quality. From the perspective of human capital, it concludes gender, degree, major and so on. Female graduates usually have less employment opportunities (Ge Yuhao, 2018), lower income and lower satisfaction (Jehn,A., 2021). From the perspective of social

capital, it concludes household income, parents' education, parents' occupation and so on. Past researches about employment quality pay more attention on its concept, index and factors, while few researches focus on the relationship between career gudaince and employment quality.

2.2 Career Guidance

The concept of "career guidance" was first proposed by Frank Parsons (1994), the founder of the Boston Consulting Group and the author of the first modern career book "Choosing a Career". Its main purpose was to address the surge of workers under the background of industrial revolution at that time, helping match the workforce with jobs. It was later adopted in the United States and even the world. Synonymous with "employment guidance" are "career guidance", "career development counseling", and etc. Currently, "employment guidance" is mainly divided into broad sense and narrow sense. In a broad sense, "employment guidance" mainly refers to comprehensive career counseling services that help job seekers establish a correct employment outlook, enhance their employability, select suitable occupations and positions, organize recruitment, and recommend jobs under the premise that the individual's willingness, interest, and professional ability match the positions in the social labor market. In the narrow sense, "employment guidance" refers to services that provide job seekers with employment information and help them find jobs. The target of employment guidance generally refers to college students who are about to graduate or adults who are unemployed due to their own or social reasons and need to be re-employed (Gati & Tal, 2008). Above all, the meaning of employment guidance in the academic circles is similar: "Employment guidance" refers to career counseling services provided by employment departments or institutions of colleges and universities for vocational students based on their own characteristics, interests, professional and technical abilities, such as organizational recruitment, psychological counseling, job adaptation and other career counseling services, to help vocational students master employment knowledge and enhance their employability through education activities aimed at establishing an employment concept.

Job-searching channel, the way for graduates to obtain employment information, affects the quantity and quality of employment information, and then affects the quantity and quality of employment. Based on ten national survey data set on Chinese college graduates' employment status from 2003 to 2021, school are the main source of job-searching information (Yue, et al., 2023). Therefore, if colleges could provide more career guidance for graduates, such as employment information and career curriculum, graduates are more likely to be satisfied with employment.

2.3 Career Readiness

Career Readiness is a crucial aspect of career selection process, encompassing the adaptation to roles from student to professional worker, training for work abilities, adjustment of personality and career, career design, and career planning, all in order to make an informed choice and excel in career. Career readiness can be divided into broad and narrow categories. The broad sense of career readiness includes not only the employment readiness made by the unemployed to engage in a certain occupation or obtain a certain position in a reasonable period of time, but also the readiness made by the employed to further their own work or change occupations. In the narrow sense, career readiness refers to the readiness work made by the unemployed in a certain stage to engage in a certain occupation or obtain a certain position (Abu, et al., 2014). The career readiness of college students, which falls under the narrow sense, mainly refers to various preparations made by college students for employment. In this context, career readiness is essentially a multifaceted process that requires an integrated approach, taking into account both short-term and long-term perspectives. It involves a range of activities such as acquiring relevant knowledge and skills, developing personal traits and characteristics that match the requirements of the job, and developing a clear understanding of one's own values, interests, and abilities. Through this process, individuals can better prepare themselves for the challenges and opportunities that lie ahead in their chosen career path (Sturges, et al., 2000).

Some past researches have proved that career readiness can significantly improve postgraduates' employment quality (Wei, et al., 2023; Xie, 2024). And for engineering students, internship, an important part of career readiness, has a significantly positive effect on their employment and employment satisfaction. Specifically, the experience of internship enables engineering students to acquire more employment information and set clearer career goals, which is helpful to improve the quality of employment (Wei, et al., 2023). However, a tracking survey of Chinese graduates in 2015 showed that engineering students had inadequate career readiness. Compared with other students, engineering students' employability training is relatively overlooked, which may be attributed to the ineffectiveness of practical experience (Song, 2017).

2.4 Relationship Among Career Guidance, Readiness and Employment Quality

In view of the relationship between the above three concepts, there has been a lot of research on the impact of employment guidance on the employment quality of college students. Some scholars focus on the theory of employment guidance, they use an interdisciplinary theoretical perspective to examine the level of employability and improve employment guidance. Other scholars focus on the research of the employment guidance courses, exploring the background and significance of the reform and innovation of the employment guidance course, and improving the implementation efficiency of the employment guidance course by reforming career planning courses

offered by higher vocational colleges. The current research situation in the academic circle can provide theoretical support and value reference for this study. However, at present, there are few studies on the internal logic of the impact of employment guidance on the employment quality of college students, that is to say, there are few studies on how employment guidance affects the quality of employment.

Fortunately, the present study reveals that career readiness, not only influenced by employment guidance (Vondracek, 2020), but also significantly impacts employment quality (Hu, 2020). Accordingly, this research aims to investigate the influence of employment guidance on employment quality through the lens of career readiness. It will emerge as a crucial factor that must be carefully considered in the design and implementation of employment guidance programs. There are two hypotheses in this study: (1) There is a significant positive correlation between college engineering students' career guidance and the quality of their employment; (2) Career readiness has a mediator effect between college engineering students' career guidance and the quality of their employment.

3. Methods

3.1 Participants

College engineering students are composed of "engineering" and "college students". Engineering is a discipline that applies the scientific principles of basic disciplines such as physics, mathematics and chemistry, combined with the technology mastered in production practice and tested by practical experience, aimed at solving practical problems. In China, Engineering consists of 31 subjects, and is the most specialized among all categories, among which the representative subject categories are machinery, electronic information, computer, automation, civil engineering and so on (Liu, et al., 2021). Therefore, the "college engineering students" involved in this study refer to undergraduate students who study engineering majors in ordinary higher education institutions, receive professional education, and engage in certain practical activities. The future employment direction of engineering and science talents depends on certain personality traits, key qualities, and general abilities. It should be noted that engineering students at the specialist level and graduate level are not the research subjects of this study.

In this study, we use data from the Questionnaire on Employment and Entrepreneurship of College Graduates in Beijing issued by the Employment Guidance Center for College Graduates in Beijing in 2020. This study focuses on fresh graduates majoring in engineering who have already been employed. And after removing missing data, a valid sample size of 2815 individuals was obtained.

3.2 Measurement

3.2.1 Dependent Variable

The dependent variable of this study is the quality of employment. We choose the employment satisfaction of college engineering students to measure the quality of employment. And it is divided into overall satisfaction and four individual satisfaction, which include salary and welfare, work place, development space, and social status.

3.2.2 Independent Variable

The independent variable of this study is career guidance measured by college engineering students' satisfaction with career guidance. Career guidance includes twelve services: (1) Campus job fair or information conference; (2) employment information services, such as information network, wechat public accounts, etc.; (3) career assessment; (4) Career guidance courses; (5) career guidance lectures, workshops and activities; (6) group career counseling; (7) individual career counseling; (8) Help for difficulties; (9) school or department employment recommendation; (10) employment internship or practice; (11) employment-related policy consultation; (12) Services such as signing procedures and employment dispatch.

3.2.3 Mediator Variable

The mediator variable in this study is career readiness, which serves as a bridge between educational experiences and future occupational outcomes. To assess this aspect, the questionnaire posed a question to college engineering students: "Do you believe that the abilities and skills you have acquired during your university education are sufficient to meet the demands of practical work?" Respondents were requested to rate their level of agreement on a scale of 1 to 5, where 1 represents strong disagreement and 5 represents strong agreement.

3.2.4 Control Variables

As presented in Table 1, the study identifies several basic control variables that are deemed relevant to the analysis. These variables include the gender of the college engineering students, their majority-minority status, origin, qualification, political affiliation, and school type. Controlling for these variables is essential to ensure that any observed relationships between the mediator and outcome variables are not confounded by extraneous factors. For instance, gender might influence career preferences and opportunities, while majority-minority status could affect workplace treatment and opportunities. Origin might impact access to educational resources and career paths, qualification reflects the level of education and training, political affiliation might influence career choices and developments, and school type could reflect the quality and resources of the education received.

Table 1 Control Variables

Control variables	Instructions
Gender	female, male
Majority-minority status	Han, non-Han
Origin	from Beijing, from outside Beijing
Qualification	undergraduate, master, doctor
Political affiliation	Communist Youth League member, Communist Party member, Communist Party probationary member, masses
School type	"Double-First Class" university, non-"Double-First Class" university

3.3 Data Analysis

As is shown in Table 2, among the three key indicators of employment guidance, employment preparation, and overall employment satisfaction, graduates from engineering majors exhibit the highest level of satisfaction towards the employment guidance they received, with an average score of 4.26. This is followed by their overall employment satisfaction, which averages at 4.18. Notably, their satisfaction towards their own employment preparation is significantly lower, scoring an average of 4.05. Furthermore, the data on overall employment satisfaction displays considerable intra-group variation, as indicated by a standard deviation of 0.72.

When examining the four sub-indicators used to measure employment satisfaction, the average satisfaction scores exhibit minimal inter-group differences. Specifically, the scores rank from highest to lowest as follows: work location (4.07), personal development space (4.04), salary and benefits (4.01), and social status (4.00). However, it is worth noting that the standard deviations for all four sub-indicators are higher than that of the overall employment satisfaction, indicating considerable intra-group variability within each sub-indicator. This finding suggests that while graduates from engineering majors generally express similar levels of satisfaction across the different aspects of employment, there are significant differences in their individual experiences and expectations within each aspect.

Table 1 Descriptive Analysis

	N	Minimum	Maximum	Mean	SD
career guidance	2815	1	5	4.26	0.603
career readiness	2815	1	5	4.05	0.631
overall	2815	1	5	4.18	0.720
salary and welfare	2815	1	5	4.01	0.811
work place	2815	1	5	4.07	0.843
development space	2815	1	5	4.04	0.789
social status	2815	1	5	4.00	0.783

Furthermore, the correlation analysis presented in Table 3 reveals a noteworthy positive association between the career guidance received by college engineering students, their level of career readiness, and the subsequent quality of their employment outcomes. The observed correlation underscores the critical role that effective career guidance plays in fostering a high degree of career readiness among students, which in turn contributes significantly to enhancing the overall quality of their employment prospects.

Table 2 Correlation Analysis

	1	2	3	4	5	6	7
1 career guidance	1						
2 career readiness	0.541**	1					
3 overall	0.416**	0.440**	1				
4 salary and welfare	0.384**	0.395**	0.755**	1			
5 work place	0.368**	0.386**	0.707**	0.648**	1		
6 development space	0.388**	0.433**	0.775**	0.747**	0.691**	1	
7 social status	0.386**	0.420**	0.764**	0.733**	0.685**	0.806**	1

**At the 0.01 level (double tailed), the correlation is significant.

3.4 Mediation Effect

In Table 4 and Table 5, we present a comprehensive summary of our key findings. Specifically, Model 1 in Table 4 illustrates the significant and positive influence of career guidance on various employment outcomes. Our results indicate that career guidance has a substantial impact on overall employment satisfaction (β=0.470, $p<0.001$), salary and wages (β=0.492, $p<0.001$), work place satisfaction (β=0.469, $p<0.001$), personal development space (β=0.472, $p<0.001$), and social status (β=0.479, $p<0.001$). These findings suggest that career guidance is a crucial factor in enhancing the overall quality of employment. Consequently, our Hypothesis 1 is supported by the empirical evidence presented in Table 4.

Table 3 Career Guidance and Employment Quality: mediated by career readiness

Dependent Variables	Independent Variables	Mediator	Control Variables	R^2	F
	Career Guidance	Career Readiness			
Overall					
Model 1	0.470*** (0.021)		YES	0.169	81.473
Model 2	0.541*** (0.017)		YES	0.276	152.677
Model 3	0.294*** (0.023)	0.326*** (0.022)	YES	0.228	103.470

Salary and Welfare					
Model 1	0.492*** (0.024)		YES	0.142	66.334
Model 2	0.541*** (0.017)		YES	0.276	152.677
Model 3	0.310*** (0.027)	0.336*** (0.026)	YES	0.191	83.074
Work Place					
Model 1	0.469*** (0.025)		YES	0.120	54.751
Model 2	0.541*** (0.017)		YES	0.276	152.677
Model 3	0.296*** (0.028)	0.319*** (0.027)	YES	0.161	67.521
Development Space					
Model 1	0.472*** (0.023)		YES	0.143	66.999
Model 2	0.541*** (0.017)		YES	0.276	152.677
Model 3	0.259*** (0.026)	0.393*** (0.025)	YES	0.215	95.290
Social Status					
Model 1	0.479*** (0.023)		YES	0.149	70.106
Model 2	0.541*** (0.017)		YES	0.276	152.677
Model 3	0.283*** (0.026)	0.362*** (0.024)	YES	0.210	93.430

***p<0.001, Standard errors in parentheses.

In examining Model 2 presented in Table 4, it becomes evident that career guidance exerts a significant and positive influence on career readiness ($\beta=0.541$, $p<0.001$). This finding underscores the critical role of career guidance in preparing individuals for successful career transitions. Furthermore, Model 3 in Table 4 demonstrates that even after introducing career readiness as a mediator, both career guidance and career readiness maintain their significant and positive impacts on overall employment satisfaction and its individual components ($\beta>0$, $p<0.001$). This suggests that career readiness acts as an important intermediary in the relationship between career guidance and employment satisfaction.

In Addition, the results presented in Table 5 provide further insight into the nature of these relationships. The direct effect size of career guidance on overall employment satisfaction is 0.294, with a 95% confidence interval of [0.249, 0.340], indicating a significant direct effect. This direct effect accounts for 62.55% of the total effect. Meanwhile, the indirect effect size of career guidance on overall employment satisfaction, mediated through career readiness, is 0.176, with a 95% confidence interval of [0.144, 0.211], suggesting a significant indirect effect as well. This indirect effect comprises 37.45% of the total effect. Importantly, these findings hold true for the six individual components of employment satisfaction as well, indicating that career readiness plays a significant mediating role in the relationship between career guidance and various aspects of employment quality. Taken together, these results provide strong support for Hypothesis 2, which posits that career readiness partially mediates the relationship between career guidance and employment quality.

Table 4 Mediation Effect

	Effect size	SE	Bootstrap 95% CI		Ratio to Total Effect
			LL	UL	
Overall					
Direct Effect	0.294	0.023	0.249	0.340	62.55%
Indirect Effect	0.176	0.017	0.144	0.211	37.45%
Total Effect	0.470	0.021	0.430	0.511	
Salary and Wage	0.294	0.023	0.249	0.340	
Direct Effect	0.310	0.027	0.257	0.362	63.01%
Indirect Effect	0.182	0.019	0.146	0.220	36.99%
Total Effect	0.492	0.024	0.446	0.538	
Work Place					
Direct Effect	0.296	0.028	0.240	0.351	63.11%
Indirect Effect	0.173	0.020	0.135	0.212	36.89%
Total Effect	0.469	0.025	0.420	0.517	
Development Space					
Direct Effect	0.259	0.026	0.209	0.309	54.87%
Indirect Effect	0.213	0.019	0.177	0.251	45.13%
Total Effect	0.472	0.023	0.427	0.517	
Social Status					
Direct Effect	0.283	0.026	0.233	0.333	59.08%
Indirect Effect	0.196	0.019	0.160	0.234	40.92%
Total Effect	0.479	0.023	0.434	0.523	

4. Conclusion

Drawing upon the preceding analysis, the current study has successfully validated two hypotheses, as evident from the findings presented in Table 6. The results demonstrate that career guidance has a substantial and favorable impact on overall employment satisfaction, salary, work environment, career development opportunities, and social status. This observation offers strong support for Hypothesis 1. These findings underscore the importance of career guidance in enhancing the overall quality of employment for college engineering students.

Table 5 Results

	Hypothesis	Result
H_1	There is a significant positive correlation between college engineering students' career guidance and the quality of their employment.	support
H_2	Career readiness has mediator effect between college engineering students' career guidance and the quality of their employment.	support

At the same time, career guidance also has a significant positive impact on career readiness. The correlation analysis conducted in this study reveals a notable positive association between the receipt of career guidance and career readiness among college engineering students, and the quality of their subsequent employment. Furthermore, taking career readiness as the mediating variable into account, career guidance and career readiness still have significant positive effects on overall and individual job satisfaction. This finding underscores the significance of career guidance in fostering the employability and readiness of engineering students, which verifies hypothesis 2. Additionally, the study has found that career guidance directly impacts overall job satisfaction and indirectly through career readiness in a significant way, as is shown in Figure 1. Therefore, it can be concluded that career guidance plays a crucial role in improving the quality of employment and enhancing career readiness. In essence, career guidance is a crucial factor that contributes to enhancing job satisfaction and improving the quality of employment.

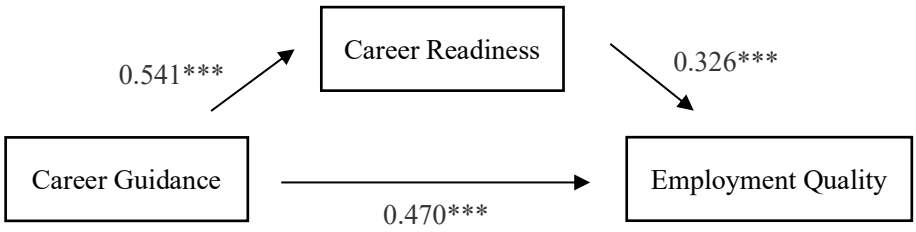

Figure 1 Mediation Path Diagram

5. Discussion

Engineering, the cornerstone of national industrial development, plays an increasingly important role in the upcoming new industrial era. With the ever-changing

international situation, engineering education plays a vital role in promoting national competitiveness. The employment quality of engineering graduates is not only directly related to personal career development, but also the key factor affecting the future training of engineering talents. High-quality employment can stimulate the enthusiasm of engineering graduates, enabling them to better utilize their professional knowledge and skills, and contribute to the country's industrial construction and scientific and technological innovation.

As the country with the largest number of engineering students in the world, China has attracted much attention on the development level of engineering education and the quality of graduates (Zhuang & Zhou, 2023). This study selected engineering college students in Beijing, China as samples, aiming to deeply understand the employment situation and development trend of engineering graduates, and provide targeted suggestions for improving the quality of engineering education. Through investigation and analysis, we verified that there exists a significant positive correlation between college engineering students' career guidance and the quality of their employment, with career readiness serving as a mediator between the two. Based on these factors, we have proposed a series of practical improvement suggestions. These suggestions will not only help to enhance the employment competitiveness of engineering graduates, but also inject new vitality into China's engineering education and industrial development.

5.1 Enriching Employment Guidance and Cultivating Positive Culture

Career guidance plays a pivotal role in shaping college engineering students' perspectives on their future professions, employment opportunities, and overall career trajectories. It is imperative to enhance their comprehension of engineering disciplines, fostering a talent pool that aligns with the evolving demands of national growth and scientific advancement. This entails deliberately directing and motivating graduates towards actively pursuing employment and entrepreneurial ventures within pivotal industries, landmark projects, and other impactful domains. To achieve this, it is essential to undertake comprehensive surveys on the employment patterns of college students and organize career planning competitions. Complementing these efforts, the introduction of career planning and employment guidance courses is crucial. These courses must adapt to the prevailing employment landscape, with curricula tailored to the distinctive features of each discipline and major. Innovative teaching methods, such as "Internet + " employment guidance live sessions, should be employed to expand access and engagement. This approach encourages engineering students to apply the theoretical frameworks of career planning courses, enabling them to holistically assess the influence of familial, academic, and societal factors. By considering their individual personalities and understanding of engineering roles, students can cultivate a career perspective that is both personally fulfilling and professionally rewarding.

5.2 Improving Career Readiness According to Characteristics and Needs

Career readiness, an essential component of employability, encompasses a range of activities, such as acquiring relevant knowledge and skills, developing personal traits and characteristics that align with job requirements, and developing a clear understanding of one's own values, interests, and abilities. Adequate employment guidance at the university level has a significant positive effect on improving engineering students' employment preparation. Traditional manufacturing technology is mature, and the income of employees is generally not high, with difficult working conditions and limited development prospects. Therefore, engineering college students have misunderstandings and doubts about the prospects of the engineering industry, avoid employment, and even do not want to work in the engineering industry. Full-time teachers, counselors, and career guidance teachers should guide students to correctly view the development history and achievements of traditional engineering, and help engineering students establish professional pride.

The employment guidance work adheres to the concept of fully staffed, whole-process, and all-round service education, covering the entire journey from freshmen entering the school to senior graduates leaving. Upon entering the school, new students use tools such as the Holland career interest test to conduct personality and interest analysis, enabling them to explore themselves and analyze their own personality strengths and weaknesses. To address the adaptability issues that freshmen may encounter, such as changes in learning styles, confusion over majors, and disinterest in their majors, we provide professional introduction and career development cognition courses. As we progress into the sophomore year, we actively respond to the training requirements of "integrating into the industry, integrating into the workplace, integrating with enterprises," combining professional knowledge and embarking on summer social practice and other activities. In my junior year, I attempted to write resumes, submit internship applications, simulate job search written exams and interviews, and through a period of on-the-job internship, integrated my knowledge of the profession with practical production. In the fourth year of college, a precise employment guidance service system is established to guide students to reasonably adjust their employment expectations, identify career positioning, and actively pursue employment. Through this process of adjustment and exploration, students are empowered to confidently navigate the job market and find their own path to success in the workplace.

5.3 Forging the Chain from Competency Base towards Employment Quality

The concept of competency-based education has evolved over time, reflecting changing industry demands and social needs. Traditionally, this approach focused solely on the acquisition of specific skills relevant to a particular industry or job role.

However, as we entered the 1980s and beyond, the emphasis shifted towards cultivating broader, more transferable skills that would aid individuals in their chosen occupation (Wiseman, 2014). In recent years, with the advent of the new industrial revolution, competency-based education has further transformed. Nowadays, it not only prepares students for specific job roles but also emphasizes the development of adaptable and resilient abilities. This includes the capacity to navigate changing work environments, collaborate effectively, and innovate continuously. This shift away from traditional knowledge-based or subject-centered education theories is crucial in enhancing both employment ability and the quality of employment opportunities.

To this end, a competency-based education theory serves as a framework for locating training objectives, designing teaching content, determining teaching methods, managing the teaching process, and evaluating teaching effectiveness (Wei, 2017). At its core, this model prioritizes ability training, making employability the cornerstone of knowledge, skills, and qualities that engineering students need for long-term professional growth. Linking personnel training with social needs, this educational approach emphasizes the establishment of an employability-oriented education concept. An employability-oriented engineering personnel training system should be implemented throughout the entire engineering university, guiding students' training based on employability, job requirements, and the principle of comprehensive physical and mental development. This ensures that students not only acquire the necessary technical skills but also develop the soft skills, adaptability, and resilience required for success in today's rapidly changing job market. By integrating these elements into competency-based education, we can effectively enhance both the employment ability and the quality of employment opportunities for engineering graduates. This holistic approach ensures that students are well-prepared, adaptable, and equipped with the necessary skills and qualities to excel in their chosen careers, contributing significantly to the growth and prosperity of the engineering sector and the broader economy.

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