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Integrating Artificial Intelligence in Career Counseling based on Needs Assessment of Chinese Undergraduate Students

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ABSTRACT

Purpose: This research focused on the needs of undergraduate students for effective career services in higher education institutes in Nanjing, China. Furthermore, the researcher also developed an AI Career Counseling Platform by integrating AI into a student career counseling service to meet the identified needs of students. **Methods:** This study consisted of two phases. In the first phase, a needs assessment survey was conducted to identify specific needs, preferences, and challenges of 384 undergraduate students selected by a multistage sampling method in Nanjing City, China. In phase two, the AI Career Counseling Platform was developed and subsequently evaluated by a panel of five experts. **Results:** Key findings from the needs assessment reveal three areas of particular importance to undergraduate students with a strong need for job-seeking counseling (mean score: 4.75), access to an alumni network (mean score: 4.84), and Entrepreneurship information (mean score: 4.72). Based on these insights, the platform Zhidada was developed. The expert panel further evaluated the platform, categorizing it as "Most Appropriate," with an average score of 4.75 for overall quality and technical development and a content suitability score of 4.74. **Implications:** This research significantly contributed to advancing the AI Career Counseling Platform by integrating students into career counseling services and expert insights, thus laying a strong foundation for enhancing career services in higher education.

Introduction

Navigating the transition from academic institutions to the professional realm presents significant challenges for graduates, primarily characterized by the complex and often overwhelming job-seeking process. This critical period necessitates robust support systems

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to effectively guide new entrants into the job market, rendering career counseling more crucial than ever (Gati & Kulcsár, 2021). Universities play a vital role in preparing students for this transition; however, traditional career counseling methods, while effective to an extent, frequently lack scalability, personalization, and accessibility. Consequently, many students find themselves underserved in their career-planning journeys (Carnevale et al., 2022).

China is currently facing structural employment challenges, compounded by a slowing economy and the collapse of the property market, which has led to a hiring slowdown that disproportionately affects new graduates. While some industries and small to medium-sized enterprises are beginning to recover, the number of new workers seeking urban employment has reached a record high, exerting additional pressure on the job market. Different groups within this demographic encounter unique challenges, making it imperative for innovative career counseling solutions to provide personalized guidance, help students develop necessary skills, and connect them with potential employers in a rapidly evolving market (Abulibdeh et al., 2024).

The rapid advancement of Artificial Intelligence (AI) offers unprecedented opportunities to address these gaps and revolutionize the education sector. AI has the potential to transform not just career counseling, but the entire educational landscape by facilitating personalized learning experiences, optimizing teaching strategies, and enhancing student engagement. AI-powered platforms can provide tailored, real-time, and scalable solutions that meet the diverse needs of job-seeking students (Maree, 2020). By leveraging AI, institutions can significantly improve the personalization of career counseling services, leading to enhanced employability and self-esteem for graduates, thereby positively influencing their future career trajectories (Cartwright et al., 2020).

The AI Career Counseling Platform emerges as a beacon of innovation, poised to redefine career counseling services and elevate the standards of educational support. This technological advancement underscores the pressing need for universities to adapt to the evolving demands of the job market while harnessing the benefits of AI to enrich the overall educational experience (Suresh et al., 2021). Furthermore, conducting a thorough needs assessment is a critical initial step in developing any educational or career guidance program. It serves as a systematic process for identifying and understanding undergraduate students' needs, preferences, and challenges in the job-seeking process. As emphasized by Maravanyika (2024), a needs assessment is essential in designing and implementing effective e-learning programs, highlighting its vital role in customizing content to align with learner expectations and enhance career readiness.

In light of these considerations, this study aimed to conduct a need-survey to identify the career counseling requirements of Chinese undergraduate students. In addition, the study sought to develop a career counseling platform integrated with AI technologies based on the identified needs. Thereby, this research is guided by two research questions as follows: RQ1: What are the students' needs for developing an AI career counseling platform? RQ2: How is the development of the AI Career Counseling Platform? The goal of this AI Career counseling platform is to assist undergraduate students in their job-seeking process and support their career development, providing them with better opportunities and prospects for the future.

Literature Review

The Current Situation of Chinese Students in Job Seeking

Chinese students face significant challenges in the job-seeking process due to a combination of structural, cultural, and personal factors. The highly competitive job market, with millions of graduates entering annually, creates a supply-demand imbalance, making employment opportunities scarce (Wei et al., 2021). A skill mismatch exists as the Chinese education system often emphasizes theoretical knowledge over practical skills, leaving graduates underprepared for workplace demands. Besides that, cultural factors, such as family expectations and the reliance on guanxi (networking), further complicate the process, particularly for students lacking strong social connections (Boo et al., 2021). Many students also lack access to comprehensive career counseling services, which leaves them ill-equipped to prepare for resumes, interviews, and navigating the job market (Huang & Curle, 2021). Additionally, rural students face economic disparities, limited resources, and fewer professional networks compared to their urban counterparts (Chen et al., 2022). Furthermore, the psychological stress of job hunting, combined with the need to adapt to AI-driven recruitment technologies, adds to the complexity of the process (Belle et al., 2021). These challenges underline the need for improved career guidance and counseling to provide undergraduate students with better opportunities and prospects for their career development.

Integration of AI in Career counseling Services

Technology further enhances job-seeking efforts among students. Various platforms, such as mobile apps and AI-driven career counseling tools, offer tailored job recommendations based on individual profiles and preferences. For instance, Baratelli and Colleoni (2022) investigated the impact of AI-enabled recruitment on employer branding and found that AI tools can streamline the recruitment process, making it more efficient and effective. By integrating similar AI tools into career counseling platforms, graduates can benefit from improved job matching and career planning services, thus increasing their chances of securing employment. These advancements not only assist in the application process but can also enhance students' self-esteem by providing them with greater confidence in their job search efforts. These initiatives help align students' skills with market demands, facilitating a smoother transition from academia to employment (Carnevale et al., 2022).

Integrating AI into career counseling revolutionizes the field by overcoming traditional challenges like scalability and personalization and transitioning from traditional interpersonal communication to innovative mobile solutions (Sriwisathiyakun & Dhamanitayakul, 2022). This approach fosters enhanced learning autonomy. AI-driven platforms analyze individual user data, offering tailored advice and career planning tools. This not only improves the user experience but also ensures guidance is aligned with current market trends and employment opportunities (Sharrab et al., 2023). By harnessing these AI technologies, the proposed AI Career Counseling Platform seeks to redefine traditional career counseling methodologies, providing a more dynamic, responsive, and effective service that can scale to meet the needs of a diverse graduate population. The

insights from these studies will directly influence the development and implementation of platform features, ensuring they are both innovative and grounded in proven research.

Maftei et al. (2022) investigated students' future career anxiety during the COVID-19 pandemic. They found that tailored career counseling can significantly reduce stress and improve career preparedness, emphasizing the need for personalized guidance in career services. Valentine and Kosloski (2021) identified critical elements of career management competencies in work-based learning programs, suggesting that incorporating expert consensus and systematic methodologies can enhance the effectiveness of career counseling tools. Their findings underscore the necessity of a well-structured framework in developing career counseling platforms.

Krouwel et al. (2019) compared expert systems, machine learning, and big data, demonstrating that machine learning algorithms can provide more accurate and dynamic career advice by analyzing large datasets to identify job market trends and individual user needs. This highlights the potential of machine learning in creating adaptive and responsive career counseling platforms. Lastly, Barile et al. (2020) focused on service ecosystem design for improving service sustainability in Italian higher education institutions. Their study demonstrated how a well-integrated service ecosystem, bolstered by Artificial Intelligence (AI) and data analytics, can significantly enhance the sustainability and effectiveness of educational and career services. These insights inform the development of an AI Career Counseling Platform that seamlessly integrates various service components, offering comprehensive support to graduates. This includes essential job-seeking guidance, access to an alumni network, and up-to-date industrial information, among other resources.

Student Needs Assessment

A needs assessment is an essential methodological approach in educational and career guidance programs. Needs assessments are systematic processes for collecting information and making justifiable decisions (Maravanyika, 2024). They serve as the preliminary step that informs the development of targeted interventions by systematically identifying and analyzing the needs, preferences, and expectations of a specific population (Logan et al., 2021). In the context of career counseling, understanding these aspects is crucial to ensure that the services provided are effective and align with the nuanced demands of the job market and the individual needs of graduates. The process of conducting a needs assessment involves several structured steps that contribute to its effectiveness. These include planning for establishing clear objectives and defining the scope of the assessment to ensure relevant data collection; developing questions by crafting questions that directly address the central aspects of the population's needs will guide the data collection process; selecting data collection methods by choosing appropriate methodologies such as surveys, interviews, and focus groups that best capture the required information; and analyzing data by employing statistical methods to process the data and derive actionable insights (Othman et al., 2022). This stage often involves calculating means, percentages, and standard deviations to highlight significant trends and areas of need. The gathered data is carefully examined to pinpoint critical needs, facilitating informed decision-making (Sriwisathiyakun, 2024). Ultimately, a needs assessment lays the groundwork for creating a platform that aligns with user expectations and maintains educational relevance.

Methodology

Research Design

Employing a quantitative research design, this study was divided into two phases. Phase one studied the needs assessment from the perspectives of undergraduate students' specific needs, preferences, and challenges in job hunting. The second phase developed AI Career counseling platform (*Zhidada*) based on the results of phase one and evaluated by experts to ensure its quality. This AI Career Counseling Platform was conceptualized and developed with the Software Development Life Cycle (SDLC) model. The quality of the AI Career Counselling Platform was evaluated by a panel of five experts, which comprised two professionals from educational technology, two from information technology, and one from education systems. This diverse group was chosen to provide a well-rounded evaluation of the platform's effectiveness and usability.

Population and sample

The need assessment survey of this study targeted a population of approximately 799,400 undergraduate students in Nanjing city, China, in the year 2024. The Yamane formula was used to measure the sample size (Yamane, 1973), and a sample of 384 was identified to represent of the population. Considering there were 34 universities in Nanjing city, a multistage sampling method was used to select this sample. In the first stage, a simple random method was used to select six universities; in the second stage, 64 students were selected by a simple random method from each of the selected six universities, resulting in a total of 384 participants. The sample comprised 55.0% female (n=211), while 45.0% are male (n=173). A majority of the students (82.0%) were between 20-22 years old (n=315), followed by 16.7% aged 22-24 years (n=64), and only 1.3% were above 24 years old (n=5). A total of 32.5% of the students (n=125) were enrolled in Arts & Humanities; 27.8% (n=107) in Science & Technology; 23.1% (n=89) in Business & Economics; 11.2% (n=43) in Social Sciences; and 5.4% (n=21) in other programs.

Research instrument

A structured questionnaire was designed with a five-point Likert scale ranging from 1 (Strongly Not needed) to 5 (Strongly Needed), encompassing multiple-choice and open-ended questions designed to elicit detailed information on students' career counseling needs, learning preferences, and perceived barriers to effective job hunting. Besides that, a pilot study was also organized to check the reliability of the developed questionnaire. As a result, the value of Cronbach's alpha is 0.95, which is greater than 0.7. indicating that the designed questionnaire for the first phase is reliable in collecting data.

Data collection

The researcher designed a comprehensive questionnaire using the "Questionnaire Star" platform to gather insights on career counselling needs and preferences. This survey link was then distributed to the offices of student affairs at six selected universities via their official email addresses. To ensure engagement and encourage participation, follow-up

phone calls were made to each office to remind them of the survey's purpose and to solicit their assistance in promoting the survey among students.

Data Analysis

Descriptive statistics were employed to determine the mean and standard deviation (SD) of the need assessment for undergraduate students. Additionally, the mean for each item was analyzed and interpreted using the 5-point Likert scale established by Nyutu et al. (2020). The interpretations are as follows: scores within the range of 4.21 to 5.00 are classified as "Strongly Needed," those between 3.41 and 4.20 indicate "Needed," scores from 2.61 to 3.40 suggest "Neutral," those between 1.81 and 2.60 reflect "Not Needed," and scores from 1.00 to 1.80 signify "Strongly Not Needed." This analysis was conducted to assess the level of need for each item in the need assessment.

Results

Right at the outset, based on insights gleaned from student needs assessment in the first phase, an AI Career Counseling Platform was conceptualized and developed with the Software Development Life Cycle (SDLC) model as shown in Figure 1. Table 1 explains the details of SDLC.

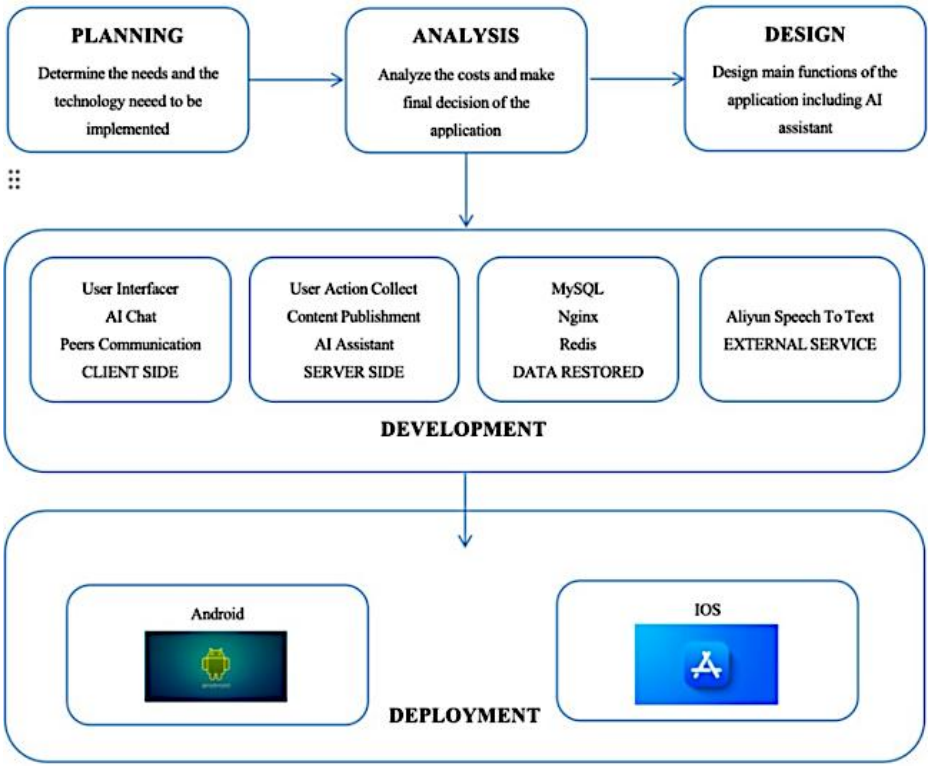

Figure 1: *Software Development Life Cycle (SDLC)*

Table 1

The development process of the AI career counseling platform

SDLC	Development stage
Planning	This project focused on developing an AI platform to assist students needing more confidence in seeking jobs.
Analysis	Examining the related concepts of AI in education, career counseling, and Conducting need assessment of undergraduate students in Nanjing City, China
Design	With the result of the need assessment, there are six main functions have been designed for the AI Career counseling platform respectively are "AI Assistant", "Career guidance", "Entrepreneurship guidance ", "Job seeking guidance", "Alumni", and "question& answer" Zone.
Development	Developers have been hired to write code based on the main functions, "Aliyu speech to text external services", "MySQL", "Nginx"," Redis", "DATA RESTORED", and Python coding languages have been used as the development tools in the developing process of AI career counseling platform. Developers write code following the chosen programming languages, tools, and standards.
Deployment	The AI career counseling platform has been released and is available to users at https://www.zhidada.com.cn; the user can also find this software on the Android app store and Apple App Store by searching "职搭搭"

Figure 2 presents the module structure of the AI Career counseling platform- Zhidada (职搭搭) which includes functions of AI assistant, career guidance, entrepreneurship guidance, job-seeking guidance, and alumni networks, to meet the student needs in job seeking process. Table 2 provides detailed introduction of each of these main functions.

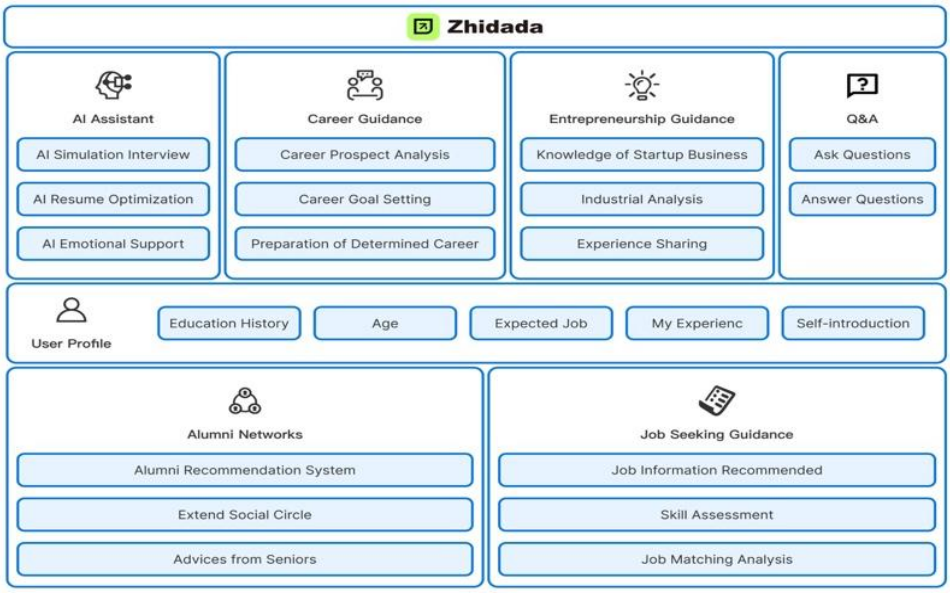

Figure 2: Module structure of Zhidada platform

Table 2

Introduction of functions on Zhidada Platform

AI platform component	Function
AI assistant	AI assistants can optimize users' resumes based on expected job position. They also provide users with various resume templates to select from. Based on user inputs of the expected job position, the AI assistant organizes simulation interviews to practice.
Entrepreneurship guidance	The platform offers guidance related to entrepreneurial consulting and training services to those users who want to start up their own business. The platform not only assists entrepreneurs with market analysis, business plan writing, fundraising, and legal consulting, but also offers entrepreneurship training courses, lectures, and workshops to help enhance their skills and knowledge.
Job seeking guidance	The platform offers job seeking guidance to help users obtain a job. It includes job matching analysis, that would help users to analyze the fitness of user's and expected job based on users' situation. It also provides skill assessment to better understand their competencies, and how to extract information from job-hunting channels compatible to users' needs.
User profile	The platform requires user profile such as age, educational history, working experiences etc. so that the AI assistant and the alumni recommendation system could function as per users' needs.
Career guidance	The career guidance function helps the users to set up a clear goal by analyzing personality, interest, and competencies. It also does prospect analysis to help users prepare for the determined career and develop the required skills and certificates.
Alumni networks	The platform recommends the alumni based on user's profile. Besides that, users can check on recommended alumni's profile prior to communicate with the alumni.
Q&A Zone	The users can ask questions related with career development and life through *Zhidada* platform, and all the users on the platform could check and answer the questions

Figure 3 shows the examples of interfaces of the developed platform, available on the website (https://www.zhidada.com.cn).

Figure 3 is an example of the interface of Personal Profile, Career Counseling, and Interview Simulation of *Zhidada* platform. In the Personal Profile function, students can fill in their personal information, such as their Graduated University and Major, and then the AI algorithm would use that information to recommend suitable jobs for them. In the Career Counseling function, students can chat with AI about their doubts about job-seeking and career-choosing process. The AI would give them personalized answers. In the Interview Practice function, students can record a short video, with specific questions, and upload it onto the platform. The video would be analyzed by AI, and suggestions to

improve interview skills would be given. In the registration step, the users can register with this platform with their telephone number; by filling out their personal information, such as age, academic major, learning university, etc.

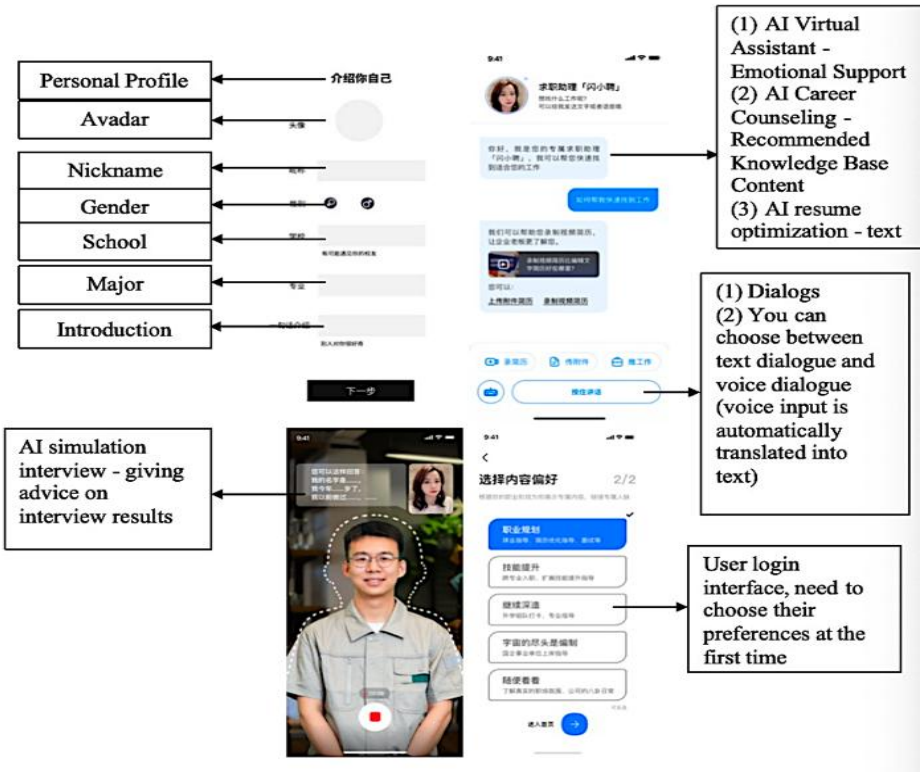

Figure 3: Examples of Interfaces on Zhidada

The main functions of this "AI robot" is to analyse users' personality and give user-specific information. For instance, "Career guidance" function helps users to find career planners from various industries for career guidance services. The "Entrepreneurship guidance" function allows users to discover entrepreneurship advisors with rich start-up business experiences and advises them on entrepreneurship activities. The "Job-seeking guidance" allows users to find job-seeking counsellors for advice in the job-seeking process. The "Alumni" function recommends users from the same universities. Besides that, the user could also post questions through the "question & answer" zone, and other users would be able to answer such questions.

Result of RQ1: What are the students' needs for developing an AI Career Counselling Platform?

The needs assessment in this study focused on three key aspects: Needs in Career Counselling, Preferences for the AI platform, and Challenges in the job-seeking process. Survey data were analysed using mean and standard deviation, with all nine items

showing strong importance, ranging from 4.3 to 4.8. Table 3 highlights these findings, indicating significant demand for the assessed items in the job-seeking process. The highest-rated need was "Access to alumni networks is important for providing support," with a mean score of 4.8. This was closely followed by "The friendliness of Job-Seeking Guidance," scoring 4.75. "Access to Entrepreneurship information" received a mean score of 4.2, reflecting its relative importance. These results suggest that enhancing access to alumni networks and providing comprehensive job-seeking guidance are critical priorities for the AI Career Counselling Platform. Addressing these needs will significantly improve the effectiveness of career services for students.

Table 3

Result of need assessments

Factors/items	Means	SD	Level
Needs in Career Counselling			
Career Counselling in the process of job-seeking	4.31	0.75	Strongly needed
Entrepreneurial guidance in the career development	4.42	0.68	Strongly needed
The friendly of Job seeking guidance	4.75	0.53	Strongly needed
Preferences of the AI-platform			
The application can facilitate the job-seeking process effectively.	4.57	0.69	Strongly needed
Access to alumni networks is important for providing support.	4.84	0.33	Strongly needed
AI services must enhance students' overall job-seeking experience.	4.66	0.65	Strongly needed
Challenges in the process of job-seeking			
Access the Entrepreneurship information	4.72	0.43	Strongly needed
The guidance of career goals of the student job-seeking.	4.64	0.48	Strongly needed
The Improvement of the Skill Set	4.55	0.57	Strongly needed

Result of RQ2: How is the AI Career Counselling Platform being developed?

After the study of need assessment in phase one, its results were utilized to develop an AI career Counselling platform (*Zhidada*), which was launched on the Apple store and Android App Store, an application which can also be download on website https://www.zhidada.com.cn. Table 4 presents the evaluation conducted by experts on AI Career Counselling. The overall quality is "Most Appropriate," with an impressive average score of 4.75. This high rating suggests a strong consensus among the experts regarding the platform's capability to meet the needs of users seeking career guidance. The content quality aspect received an outstanding rating of " Most Appropriate " at 4.74, indicating that the information and resources provided by the platform are not only relevant but also highly valuable for users navigating their career paths. This score reflects the careful curation and development of content that resonates with the users' goals and challenges. Moreover, the technical performance and implementation of the platform were also rated as "Most Appropriate," achieving a score of 4.75. This reinforces the significance of the platform's design, functionality, and user experience, which are critical for ensuring that the platform is intuitive and effective in delivering career counselling services.

Table 4

Quality Assessment of AI Career Counselling Platform by Experts (n=5)

Assessment Items	Mean	S.D.	Level
Content Quality			
Alignment with the development 's objectives	4.80	0.40	Most Appropriate
The career information provided is accurate and relevant.	4.60	0.49	Most Appropriate
The resources are current and aligned with industry trends.	4.75	0.43	Most Appropriate
Clarity and appropriateness of language	4.85	0.37	Most Appropriate
Accessibility and comprehension	4.70	0.45	Most Appropriate
Average	4.74	0.43	Most Appropriate
Technical Performance			
Speed and responsiveness of the platform	4.65	0.48	Most Appropriate
The platform is user-friendly for students and educators.	4.85	0.37	Most Appropriate
The platform offers comprehensive career counseling tools.	4.80	0.40	Most Appropriate
The AI accurately matches students with suitable career paths.	4.75	0.43	Most Appropriate
It functions effectively on all educational devices.	4.70	0.45	Most Appropriate
Average	4.75	0.43	Most Appropriate
Implementation			
The platform creatively addresses career counseling challenges.	4.80	0.40	Most Appropriate
It presents unique features compared to other tools.	4.75	0.43	Most Appropriate
The platform can scale to accommodate a large number of students.	4.85	0.37	Most Appropriate
It is flexible enough to integrate with different educational systems.	4.65	0.48	Most Appropriate
The platform significantly enhances career counseling services.	4.70	0.45	Most Appropriate
Average	4.75	0.43	Most Appropriate
Total Average	4.75	0.43	Most Appropriate

Discussion

The result of phase one showed that Career counselling, Entrepreneurship counselling, and Job search counselling were strongly needed for undergraduate students to understand the job market and their strengths, enabling them to make informed career choices. Chen et al. (2022) also stated that many students lack clarity in career development; therefore, career counselling could help graduates better understand their professional interests, establish career goals and ideals, and develop a personal career plan to achieve a scientific match between the individual and the job. It is also claimed that entrepreneurship counselling fosters graduates' innovation and entrepreneurial abilities, providing guidance and support for self-employment. Gati and Kulcsár (2021) express that Job search counselling helps graduates enhance their job-seeking skills and increase employment opportunities. College students can access information about internships and job opportunities through alumni networks and receive recommendations and internal

referrals through alumni connections (English et al., 2021). AI technology plays an increasingly important role in the job search process; AI tools such as intelligent job matching systems, automated resume screening, and video interview evaluation assistance can improve the efficiency and accuracy of recruitment (Lyu & Liu, 2021).

The strong preference for personalized guidance identified in our needs assessment aligns with Saleem et al. (2021) that personalized digital interventions significantly enhance engagement and outcomes in career services. Our results also support the use of multimedia content, which is consistent with the theory of multimedia learning, suggesting that such content can greatly improve information retention and user satisfaction in educational settings (AlShaikh et al., 2024). The data indicate that AI-driven career counselling services have a considerable advantage in meeting the expectations of modern job seekers. By showcasing the practical benefits of AI—such as improved job match accuracy and enhanced user engagement, our findings make a compelling case for broader adoption across educational institutions and corporate environments. To facilitate the integration of this platform, it is essential to discuss how organizations can adopt and utilize these AI tools effectively. This involves understanding the necessary technical requirements, training staff, and aligning the platform with existing career services. Additionally, potential challenges, such as integrating AI into current systems and addressing user concerns about technology adoption, must be considered. By proactively addressing these issues, stakeholders can ensure a smoother implementation and maximize the platform's benefits.

Conclusion and Recommendation

This study has conducted a comprehensive needs assessment of undergraduate students during the process of job seeking. The needs of AI career counselling, the preferences, and the challenges have been highlighted in this paper. Furthermore, an AI Career Counselling Platform-*Zhidada* has been developed and offers diverse services, including career counselling, entrepreneurship guidance, job-seeking assistance, and access to alumni networks to meet needs identified in the student need assessment survey, Meanwhile, such a platform is expected to enhance students in job job-seeking process.

However, the developed platform in this research has only been evaluated by related experts but has not yet been used by students to find the empirical evidence to support its effectiveness in the process of students' job seeking. Hence, it is highly recommended to conduct an experimental study to evaluate the long-term impact of AI-driven career counselling on students' job placement success and career satisfaction in further research. Furthermore, the developed AI Career Counselling Platform is only in Mandarin; the international version of such a platform is highly recommended to enhance accessibility, it also opens opportunities for future adaptations for non-Mandarin speakers.

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