Precise Needs Diagnosis and Personalized Guidance Strategies in AI-empowered College Career Planning Courses

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Abstract: *Against the backdrop of the popularization of higher education and the diversification of the job market, the precision and personalization of career planning courses for college students have become two key demands for improving the quality of education. Traditional course models, constrained by limited teaching resources and diagnostic tools, struggle to address individual differences and evolving developmental needs among students. AI technology provides technical support for curriculum innovation with its core advantages such as data processing, intelligent analysis and adaptive interaction. Based on the core pain points of college students' career planning, this paper departs from the dimension reconstruction of needs diagnosis and the technological realization pathways to explore the application value of AI in interest trait identification, competency deficit localization, and occupational cognition bias calibration, and then propose personalized guidance strategies covering the dynamic generation of course content, intelligent feedback in the guidance process, and long-term monitoring of career development, aiming to provide practical reference for promoting career planning courses to shift from "standardized provision" to "personalized fulfillment".*

Keywords: *AI Technology; Career Planning Course; Precise Needs Diagnosis; Personalized Guidance; College Students*

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1.Introduction

As an important vehicle connecting higher education and the job market, college career planning courses aims to help college students establish a clear career cognition, establish their development direction and enhance their employment competitiveness. However, the model of "large-class teaching + unified content" still dominates in current curriculum practice. Teachers mostly rely on their experience to judge college students' needs, resulting in a disconnection between course content and college students' individual characteristics, professional backgrounds, and career aspirations. Some college students have had some problems, such as ambiguous career orientation and intensified employment anxiety, because they are unable to receive targeted guidance. With the rapid development of technologies, such as generative AI and big data analysis, a "personalized revolution" has quietly begun in education sector. AI technology can break through the time-space constraints and resource barriers of traditional teaching. By collecting and intelligently analyzing college students' multi-dimensional data in real time, it can accurately capture their real needs in career planning. Meanwhile, industry-education integration provides realistic scenarios for AI technology to align with industry demand. The combination of the two can enables dual augmentation through "technology-driven precise diagnosis" and "industry-anchored authentic orientation" [1]. It is not only an inevitable requirement in response to the digital transformation of education, but also a key pathway for solving the problem of mismatch between supply and demand of courses and enhancing the education efficacy to deeply integrate AI technology and industry-education integration into career planning courses.

2.Main Logic of AI-empowered College Career Planning Courses

2.1 *Solving the Problem of Supply-Demand Mismatch in Traditional Courses*

Supply-demand mismatch of traditional career planning courses is mainly embodied in three aspects. The first is the ambiguity of needs diagnosis. Teachers mostly collect college students' needs through classroom questioning,

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paper questionnaires and other methods. Such approaches are not only inefficient but also easily influenced by college students' subjective expression biases, making it difficult to explore their potential career Aspirations. The second is the homogenization of course content. Both public foundational courses and specialized courses predominantly employ homogenized textbooks and syllabi, failing to accommodate the differentiated needs of college students across disciplines and academic progression levels. The third is the lag in guidance and feedback. After-school guidance mostly relies on teachers' spare time, making it difficult to provide real-time responses to students' questions in career planning, which greatly reduces the efficacy of guidance [2]. AI technology has fundamentally changed this situation. Intelligent data collection and analysis systems enable precise orientation of students' needs. Adaptive learning platforms realize personalized feeds of course content. Intelligent interaction tools achieve real-time guidance and feedback. Industry-education integration mechanism provides support of data from the industry end for AI, such as the latest job competency models of enterprises and the trends of industry demand for talents, and makes the content of needs diagnosis and guidance more in line with the actual situation of the job market, thereby effectively resolving the supply-demand contradiction of traditional courses.

2.2 *Reconstructing the Closed-loop System of "Diagnosis → Guidance → Feedback" in the Courses*

Career planning is inherently an iterative recalibration process, requiring a closed-loop system encompassing needs diagnosis, personalized guidance, efficacy feedback, and scheme optimization. Under the traditional curriculum model, this closed loop system struggles to operate effectively due to the fragmentation of each link. Diagnostic results cannot be promptly transformed into guidance content, and there is also a lack of a scientific evaluation mechanism for the guidance efficacy. AI technology connects all the links of the closed loop system through data to form an automated operation mode of "data collection → intelligent analysis → guidance generation → feedback collection → model optimization". In the diagnosis session, AI collects multi-dimensional information such as college students' learning behaviors, assessment data, and career intention, and equally integrates data on job requirements provided by cooperative enterprises engaging in industry-education integration to build a comprehensive student profile and person-post fit model. In the guidance session, AI generates personalized course content and planning suggestions based on the profile. In the feedback session, AI continuously optimize the diagnostic models and guidance schemes based on college students' learning feedback and career development data to ensure that the entire curriculum system always keeps pace with college students' dynamic needs [3].

3.Dimensions and Pathways of Precise Needs Diagnosis in AI-Empowered College Career Planning Courses

3.1 *Core Dimension Reconstruction of Precise Needs Diagnosis*

AI-based precise needs diagnosis transcends a simple upgrade of traditional needs research, shifting from a single "career intention" research to multi-dimensional "professional quality" diagnosis, specifically covering three core dimensions. The dimension of interest traits serves as the foundation of career planning, directly determining college students' professional identity and engagement. Traditional interest tests mostly employ standardized tools such as Holland's Self-Directed Search, and the results are rather rigid, struggling to reflect the dynamic changes in interests. AI technology achieves precise diagnosis of interest traits in two ways. On the one hand, it analyzes college students' social media updates, study notes, course assessments and other text data based on natural language processing technology to mine their potential career interest orientation; On the other hand, it records college students' behavioral preferences through intelligent interactive scenarios, such as their choices and engagement in different job tasks in career simulation courses, and then constructs a dynamically-updated interest trait model. The dimension of competency deficits is the core of career planning, determining college students' career competitiveness [4]. Traditional competency assessment mostly relies on outcome-oriented data such as examinations and internship assessments, struggling to comprehensively reflect college students' competency structure. AI technology breaks down the core job competence provided by enterprises engaging in industry-education integration

into specific indicators by constructing a competency graph. Then, it combines with college students' course learning data, skill assessment data, project practice performance, etc., to use machine learning algorithms to accurately identify their competency deficits, making competency diagnosis more employment-oriented.

3.2 *Technological Realization Pathways for Precise Needs Diagnosis*

Multi-source data collection is the foundation of precise diagnosis. It is necessary to break down data silos and build a comprehensive student data system. The data sources mainly include three categories. The first is course learning data, such as course engagement duration of college students on the career planning platforms, assignment completion metrics, and discussion board contributions. The second is trait assessment data, including standardized psychological testing results, behavioral data in AI interaction scenarios, etc. The third is external associated data, which not only covers college students' specialized course grades, internship experience records, and career information query history, but also includes industry-end data such as job demand lists, talent capability assessment standards, and industry development reports of cooperative enterprises engaging in industry-education integration. To ensure the legality and security of data collection, it is necessary to establish a clear data authorization mechanism and adopt encrypted storage technology to ensure that student data is only used for career planning guidance. Intelligent data analysis is the core of precise diagnosis and needs to rely on algorithm models to achieve the transformation from data to needs [5]. Firstly, data cleaning technology can be used to remove invalid data, such as extreme value and duplicate data, to ensure data quality. Secondly, natural language processing technology can be adopted to conduct semantic analysis on text data and extract key information such as identifying college students' career puzzles from their speeches in discussions. Thirdly, clustering algorithms can be utilized to classify student groups, and identify the common needs of different groups, and personalized recommendation algorithms can be employed to mine individual unique needs. Finally, a needs diagnosis model can be it constructed to transform multi-dimensional data into visualized needs reports for student career planning, providing teachers with clear guidance basis. Dynamic needs updates serve as an extension of precise diagnosis, ensuring that needs diagnosis is in step with college students' development. AI technology continuously optimizes the results of needs diagnosis by collecting student data in real time.

4.Actionable Strategies for Personalized Guidance in AI-Empowered College Career Planning Courses

4.1 *Personalized Generation and Feeds of Course Content*

AI-based course content generation needs to break the fixed model of traditional textbooks and build a dynamically-updated course resource library. The industry-education integration provides updated industry-focused content support for the resource library. On the one hand, AI can analyze students' disciplinary foundation and career aspiration profiles to intelligently curate foundational knowledge modules and industry-aligned practice cases from the resource library. For instance, for college students majoring in computer science who intend to be AI engineers, it can recommend relevant vocational skills courses such as machine learning and algorithm design, while integrating AI project development cases and work specifications of cooperative enterprises. On the other hand, in response to college students' competency deficits and lump-sum illusion, AI can generate customized supplementary content. For instance, it can recommend micro-courses on workplace communication skills and authentic business negotiation cases from enterprises to college students with insufficient communication skills, and push industry development report interpretations and practical operation guides for cooperative media enterprises to college students with cognitive biases about the new media industry. The feed approach of course content shall adhere to the "precision-based and scenario-based" principle. AI can adopt a "fragmented + systematic" combined feed mechanism based on college students' learning progress and time arrangement. For instance, it can push 5–10-minute short videos on skills and knowledge points as well as little knowledge about corporate positions to college students during their spare time, and on weekends, it can recommend systematic career planning case

analysis courses and online lectures by industry mentors.

4.2 *Intelligent Interaction and Matching in the Guidance Process*

The intelligent question-answering system is an important tool for achieving personalized guidance, which can provide college students with 7* 24-hour real-time guidance services. The system integrates the career planning knowledge graph with the knowledge base of enterprises engaging in industry-education integration, covers multiple aspects such as career selection, resume writing, interview skills, industry trends, and job requirements of enterprises, and enables to quickly respond to college students' personalized questions. For complex problems, the system can automatically transfer them to professional teachers, achieving the organic combination of AI-assisted and human guidance. Virtual career simulation scenarios provide college students with an immersive practice experience platform. AI technology creates immersive virtual workplaces that replicate authentic job task scenarios, including corporate recruitment simulations, project team collaboration scenarios, and client negotiation scenarios. The performance of college students in virtual scenarios will be recorded and analyzed in real time by AI, and the system will provide targeted guidance and suggestions based on their behavioral performance.

4.3 *Scientific Assessment and Optimization of Guidance Efficacy*

The traditional course efficacy assessment mostly relies on student satisfaction surveys and exam results, struggling to comprehensively reflect the actual impact of guidance on college students' career development. AI technology has established a multi-dimensional efficacy assessment system, which conducts assessments from three aspects: short-term learning outcomes, medium-term practice performance, and long-term career development. Among them, the practice assessment from enterprises engaging in industry-education integration has become one of the core reference indicators. Short-term assessment includes quantitative indicators such as college students' course completion metrics, passing rate of skills assessment, and completeness of career planning schemes. Long-term assessment assesses the long-term efficacy of guidance schemes by monitoring college students' internship and employment situation, career advancement paths, career satisfaction and other data.

5.Constructing a Safeguard System for AI-Empowered College Career Planning Courses

5.1 *Building a Safe and Efficient Intelligent Platform*

A stable and secure intelligent platform is the cornerstone for the application of AI technology, while the core value of the platform lies in the functional design that aligns with the needs of industry-education integration. Colleges and universities need to collaborate with technology enterprises to jointly develop a specific platform that meets the requirements of career planning courses, ensuring that the platform has strong data processing capabilities and enables smooth interactive experience. In terms of technical architecture, it needs to adopt cloud computing and distributed storage technologies to ensure the efficient processing and secure storage of multi-source data. In terms of functional design, it needs to achieve seamless integration of functions such as data collection, needs diagnosis, personalized feeds of courses, guidance interaction, and efficacy assessment.

5.2 *Enhancing Teachers' Ability to Apply AI*

Teachers are the key bond in the integration of AI technology and course teaching, and their ability to apply AI technology directly affect the efficacy of technological empowerment. Colleges and universities need to establish a systematic teacher training system to enhance teachers' ability to apply AI technology and data literacy. The training content includes the operation and use of intelligent platforms, the interpretation and analysis of AI diagnosis results, AI-based course design and guidance methods, as well as the cooperation mechanism of industry-education integration, the analysis of enterprises' talent demand, and school-enterprise collaborative guidance skills, etc. Meanwhile, they need to encourage teachers to participate in the research on the application of AI in education, put forward technology optimization suggestions based on teaching practice, and promote the deep integration of AI technology and course teaching. Furthermore, they can form a teaching team composed of career development

educators, AI technology experts, and industry mentors to achieve complementary advantages and enhance the professionalism and pertinence of the guidance.

5.3 *Regulating the Application Boundaries of AI Technology*

To ensure the healthy application of AI technology in courses, it is necessary to establish a complete set of institutional norms. On the one hand, it is necessary to define the application boundaries of AI technology, emphasize that AI is an auxiliary guidance tool rather than a substitute for teachers. For the guidance involving value judgment, emotional support and other aspects, it is necessary to be teacher-led to avoid excessive reliance on the application of technology. On the other hand, it is necessary to make data usage norms, clearly define the scope, and purpose of data collection and storage period of data, and establish a student data authorization and traceability mechanism to ensure students' right to know and right of control.

6.Conclusion

AI technology has provided unprecedented opportunities for the precise and personalized innovation of college career planning courses. Through its deep application in the dimension reconstruction of needs diagnosis, the generation of course content, the interaction of guidance process, the optimization of efficacy evaluation, AI technology has effectively solved the problem of supply-demand mismatch in traditional courses and constructed a dynamic closed-loop system of "diagnosis → guidance → feedback". However, AI empowerment transcends mere technological superposition, constituting a systemic paradigm shift in multiple aspects such as curriculum philosophy, teaching models, and faculty competencies.

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