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Innovative Exploration on the Talent Cultivation Mode of Computer Majors in Institutions of Higher Learning amid the Artificial Intelligence Era

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Abstract: With the advent of the artificial intelligence era, sweeping and profound transformative reforms have permeated every industrial sector across the globe. The rapid iterative upgrading of cutting-edge technologies and the vigorous expansion of new productive forces have imposed an imperative demand for paradigm restructuring on the talent cultivation of computer-related disciplines in domestic universities and colleges. Conventional talent training frameworks, which are rigid in structure and outdated in orientation, can no longer keep pace with the requirements of industrial restructuring and the personalized developmental aspirations of enrolled students. Against such a contextual backdrop, this paper focuses on exploring innovative developmental pathways for computer talent cultivation under the AI-driven landscape, aiming to provide systematic theoretical references and practical guidance for higher education institutions to cope with technological revolutions, upgrade the comprehensive quality of talent cultivation, and align disciplinary construction with the practical demands of industrial advancement and social progress.

Keywords: Artificial intelligence; Institutions of higher learning; Computer major; Talent cultivation; Core competitiveness; Educational paradigm; Interdisciplinary integration

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1. Introduction

Propelled by breakthrough innovations in artificial intelligence technologies, the digital economy and intelligent industries are undergoing accelerated iterative evolution, which is profoundly reshaping the global landscape of technological competition and the structural composition of market talent demands. As the core incubation base for high-caliber computer professionals, universities shoulder the pivotal strategic mission of cultivating innovative talents for national strategic layout and industrial upgrading. Their talent cultivation mechanisms exert a direct and far-reaching impact on the developmental quality and core competitive

edges of China's domestic artificial intelligence industry [1]. The in-depth interdisciplinary integration between artificial intelligence and computer science has spawned emerging occupational categories, updated competency benchmarks, and thus set elevated comprehensive qualification standards for university-trained computer practitioners. Hence, innovating and optimizing the prevailing computer talent cultivation systems in accordance with the intrinsic characteristics of the AI age and industrial practical needs carries profound theoretical significance and practical value for advancing the high-quality development of computer education and fostering competent professionals adaptable to contemporary developmental trends.

2. Merits of innovating the computer talent cultivation mode under the artificial intelligence background

2.1. Restructure the teaching curriculum system to match the developmental demands of the AI industry

In the artificial intelligence epoch, emerging technologies and functional innovations in the field of computer science emerge incessantly, which necessitates the continuous optimization of university teaching syllabi to conform to industrial evolutionary characteristics and developmental tendencies [2]. Leveraging advanced artificial intelligence algorithms and big data analytics, instructors can implement systematic, precise statistical analysis on the actual occupational requirements of various posts in the computer industry. They can extract core theoretical knowledge, professional skill sets, and practical operational capabilities demanded by industrial practitioners, followed by screening, integration, and dynamic revision of conventional teaching contents. Outdated curricular modules that are incompatible with contemporary technological progress are eliminated, while cutting-edge AI achievements, interdisciplinary knowledge, and industry-specific application cases are supplemented to construct a multi-layered, modular teaching framework anchored in fundamental theories, highlighted by frontier technologies, and characterized by cross-disciplinary integration. Furthermore, big-data analytics enable real-time tracking of technical iterations, industrial policy adjustments, and shifting market needs in computer sectors, facilitating the timely embedding of the latest research fruits covering artificial intelligence, big data, cloud computing, blockchain, and intelligent algorithms into classroom instruction. This ensures the timeliness, advanced nature, and practicality of teaching resources, effectively mitigating the risk of decoupling between academic education and industrial practice [3].

2.2. Realize personalized and targeted teaching to boost students' independent learning capacity

The booming advancement of artificial intelligence has diversified the available pedagogical instruments and furnished solid technical underpinnings for the reform of computer teaching models. On one hand, big-data-enabled analytical tools are capable of collecting and dissecting massive volumes of data concerning students' learning behaviors, academic paces, knowledge mastery degrees, cognitive styles, and personal interests. Based on this data, intelligent systems generate individualized learning portraits, pinpoint learners' practical learning needs, vulnerable knowledge modules, and inherent studying traits, and further design tailor-made learning schedules, teaching strategies, and assessment plans accordingly [4]. On the other hand, intelligent learning platforms equipped with real-time feedback mechanisms provide instant academic support for students. Once learners encounter obstacles or puzzles during the learning process, such systems can promptly identify the root causes of their difficulties, push targeted tutoring materials, and offer step-by-step guidance,

thereby helping undergraduates resolve academic predicaments autonomously, cultivate self-directed learning habits, and enhance their independent learning proficiency and lifelong learning capacity.

2.3. Cater to industrial upgrading and consolidate talent reserve for the artificial intelligence sector

The rapid technological renewal of artificial intelligence has triggered profound structural shifts in computer-related industries. The industrial developmental focus has shifted from rudimentary technical application toward core technology R&D, interdisciplinary innovative integration, and intelligent system optimization, which has brought forth upgraded requirements on the knowledge framework, hands-on proficiency, innovative thinking, and comprehensive literacy of computer talents [5]. Equipped with sophisticated AI analytical tools and industry-university-research collaborative platforms, university educators can systematically optimize talent cultivation objectives, curriculum layouts, instructional methodologies, and performance appraisal criteria. By precisely docking with industrial developmental demands, higher education institutions can readjust their talent training orientations, formulate scientific and feasible cultivation frameworks compatible with AI industrial progress, and effectively improve the pertinence, practicality, and efficiency of talent incubation. This enables universities to output a steady stream of competitive professionals with solid theoretical foundations, strong practical abilities, and innovative spirits for relevant industrial chains. Meanwhile, the reformed cultivation mechanism facilitates in-depth university-industry synergy, promotes seamless coordination among classroom teaching, scientific research, and industrial practice, and shortens the adaptation period of newly graduated talents in the workplace, enabling them to integrate into on-the-job operational environments swiftly [6].

3. Predicaments restricting the innovation of the computer talent cultivation mode in the AI era

3.1. Vague cultivation targets detached from contemporary industrial requirements

As the core directional benchmark of the entire training framework, scientific and targeted talent cultivation objectives determine the selection of teaching content, the design of instructional approaches, and the formulation of assessment systems. Their rationality and forward-looking nature directly dominate the subsequent talent output quality. At present, quite a number of tertiary institutions lack a lucid and in-depth understanding of the core competency standards for computer practitioners in the AI era. They fail to distinguish the differentiated training orientations between traditional computer talents and artificial intelligence-oriented professionals, and their training plans still center on the inculcation of basic theoretical knowledge and elementary operational skills. These plans ignore the cultivation of critical competencies essential under AI circumstances, such as interdisciplinary integration capability, innovative thinking, algorithmic logic, data analysis proficiency, and lifelong learning competence, resulting in graduates who are unable to satisfy the diversified and high-end industrial demands [7]. Besides, insufficient in-depth communication and collaborative research with industrial entities during the formulation of cultivation targets leads to a poor awareness of the latest post specifications, skill thresholds, and industry development trends. This results in a conspicuous disconnection between preset training directions and real market expectations, rendering the cultivated talents less competitive in the job market.

3.2. Backward curriculum setup with insufficient compatibility to computer industrial evolution

The curriculum architecture functions as the core carrier of talent cultivation and the essential channel to fulfill preset training goals. Nevertheless, the computer industry is experiencing a drastic transformation amid artificial intelligence penetration, with updated occupational competency standards and rapidly evolving technical requirements [8]. Most university computer curricula still inherit conventional structural frameworks dominated by classic theories and basic operational courses. They lack sufficient coverage of cutting-edge disciplines and interdisciplinary fields such as artificial intelligence, big data analytics, cloud computing, blockchain technology, natural language processing, and intelligent robotics. Partial teaching contents even lag far behind industrial progress by several years, leading to a significant deviation between the knowledge and skills students acquire and the practical demands of their future posts. Moreover, many colleges fail to establish a dynamic curriculum revision mechanism in response to AI technological evolution and shifting industrial needs. This results in isolated courses with overlapping contents, incoherent knowledge progression, and an irrational proportion between theoretical courses and practical training. Such problems hinder the construction of systematic, hierarchical, and practical knowledge and skill systems for students. The absence of specialized frontier courses, interdisciplinary modules, and industry-customized training programs further aggravates the bottlenecks in curriculum optimization.

3.3. Underdeveloped faculty team with inadequate supporting capacity

The explosive advancement and extensive popularization of artificial intelligence have imposed upgraded requirements on the academic attainment, technical proficiency, and instructional capabilities of university computer instructors. However, a large proportion of teaching cohorts in domestic universities suffer from prominent drawbacks in knowledge composition, practical experience, and pedagogical concepts, which make them unable to meet the demands for cultivation reform [9].

First of all, numerous teachers have long been engaged in conventional computer teaching and lack systematic academic training and professional development on cutting-edge AI technologies. Their knowledge reserve remains confined to traditional disciplinary domains, and they are unable to grasp the core theories, technical principles, and practical applications of big data, cloud computing, and related fields. Secondly, many instructors are divorced from frontline industrial practices and possess limited insights into the real application scenarios, technical bottlenecks, and development trends of AI technologies. Hence, they struggle to incorporate practical industrial experience, real project cases, and cutting-edge technical achievements into daily classroom teaching, resulting in a lack of practicality and pertinence in instruction. Thirdly, certain educators still adhere to the traditional cramming-based spoon-feeding pedagogy and are reluctant to explore and adopt AI-driven innovative teaching modes such as project-based learning, case-based teaching, and virtual simulation teaching [10]. This leads to a monotonous teaching process, low student participation, and inadequate cultivation of students' innovative thinking and practical abilities.

4. Innovative paths for computer talent cultivation reform under an artificial intelligence background

4.1. Clarify cultivation objectives based on AI developmental characteristics

As the fundamental guiding principle of talent development, scientifically positioned and forward-looking training targets lay a solid foundation for subsequent teaching arrangements, curriculum design, and teaching

practice. Colleges and universities need to formulate a tiered, systematic, and dynamic objective framework proceeding from the developmental trends of AI technology and the practical demands of the industry. They should break the drawbacks of ambiguous, outdated, and homogeneous traditional planning to realize seamless alignment between talent cultivation and market evolution [11]. Specifically, educators shall first conduct in-depth research and analysis on the core literacy and competency indicators indispensable for computer practitioners in the AI era, and establish a tripartite training system covering knowledge accumulation, capability advancement, and comprehensive quality improvement. At the knowledge dimension, it is necessary to consolidate students' grounding in foundational computer theories such as data structures, algorithms, and computer networks, while supplementing systematic learning of professional knowledge in artificial intelligence, big data analytics, cloud computing, and intelligent systems. At the capability dimension, priority should be given to the cultivation of practical innovation, interdisciplinary integration, lifelong learning, problem-solving, and team collaboration capacities to break the confinement of single-skill-oriented training. At the literacy dimension, great importance should be attached to nurturing students' ethical judgment, social responsibility, innovative mindset, and global perspective, so as to cater to the high-level recruitment criteria of AI industries and facilitate the all-round personal development of students [12]. Additionally, universities should build regular industrial demand investigation mechanisms, strengthen communication and cooperation with leading enterprises in the computer and AI fields, collect updated post requirements and skill standards dynamically, and adjust training targets and cultivation plans in a timely manner to maintain the timeliness and pertinence of talent cultivation.

4.2. Optimize computer teaching curricula to keep pace with technical evolution

From the perspective of curricular structure optimization, higher learning institutions ought to substantially raise the proportion of AI-related courses in the overall curriculum system of computer majors. They should add core compulsory modules, including Machine Learning, Deep Learning, Principles of Artificial Intelligence, Big Data Analytics, and Cloud Computing Technology, alongside elective subjects such as Natural Language Processing, Computer Vision, Intelligent Robotics, and Blockchain Application, to synchronize teaching contents with the cutting-edge developments of the industry [13]. Meanwhile, universities should construct interdisciplinary curriculum clusters by integrating computer science with artificial intelligence, internet of things, statistics, mathematics, management science, and ethics. This helps to broaden students' academic horizons and foster their cross-field comprehensive capabilities. From the perspective of specific course content updating, it is essential to formulate a dynamic updating mechanism for teaching materials and syllabi. Universities should continuously incorporate the latest industrial technological breakthroughs, academic research achievements, and post-skilled specifications into teaching content, enrich core modules related to algorithms, big-data processing, intelligent system development, and blockchain technology, and realize in-depth linkage between curriculum iteration and technical upgrading. In accordance with the transitional features of the industry, universities should construct a complete, hierarchical, and practical knowledge and skill framework by combining abstract theoretical elaboration with concrete technical operation, on-site vocational practice, and project development. This not only helps students master solid professional knowledge and skills but also cultivates their frontier awareness, innovative thinking, core competitive strengths, and sustainable learning potential [14].

4.3. Upgrade teaching pedagogies to boost classroom and talent cultivation quality

As a vital medium connecting teaching resources and student absorption, innovative pedagogies empowered by artificial intelligence contribute remarkably to the improvement of teaching quality and talent cultivation efficiency. At the online teaching stage, instructors can utilize intelligent learning platforms to assign preview videos, electronic courseware, and pre-class quizzes. Learners can resort to intelligent Q&A systems, online discussion forums, and virtual tutoring robots to resolve academic confusion independently during self-study and construct personalized knowledge systems [15]. In addition, intelligent platforms can push customized learning materials, targeted exercises, and supplementary resources based on individual learning weaknesses and cognitive characteristics, helping students make up for deficient knowledge efficiently and achieve personalized development. At offline classroom sessions, teachers can analyze online learning statistics and student feedback data to pinpoint students' vulnerable knowledge points and learning difficulties, and then deliver targeted explanations, in-depth discussions, and hands-on tutoring. Centered on core disciplinary knowledge and AI practical application requirements, comprehensive project assignments and real industrial projects can be deployed to guide students to apply theoretical knowledge to practical problem-solving. This deepens students' theoretical comprehension and improves their problem-solving, innovative, and team collaboration abilities amid project implementation. Besides, immersive virtual simulation teaching built upon VR (Virtual Reality) and AR (Augmented Reality) technologies can transform intangible, abstract theories and complex technical principles into perceptible, interactive virtual scenarios. This not only enhances students' interest in learning but also strengthens their practical operational proficiency and technical application capabilities. For instance, teachers can launch a developmental project of an Intelligent Text Classification System, guiding students to sort out core developmental requirements covering data collection, data preprocessing, feature extraction, model construction, algorithm optimization, and result visualization. Through the whole process of project development, students' abilities in demand analysis, logical reasoning, technical implementation, and system debugging can be effectively exercised.

5. Conclusion

To sum up, in the context of the rapid development of artificial intelligence, the innovation of computer talent cultivation mode in institutions of higher learning is an inevitable requirement to adapt to technological revolutions, industrial upgrading, and social progress. By targeting the existing predicaments such as vague cultivation targets, backward curriculum setup, and underdeveloped faculty teams, universities can effectively resolve the disconnection between conventional cultivation models and contemporary market needs through measures such as clarifying scientific cultivation objectives based on AI developmental characteristics, optimizing computer teaching curricula to keep pace with technical evolution, and upgrading teaching pedagogies empowered by intelligent technologies. These efforts not only help to upgrade students' comprehensive literacy, professional skills, and core competitiveness but also cultivate abundant high-caliber computer professionals with solid theoretical foundations, strong practical abilities, and innovative spirits for the booming artificial intelligence industry. This provides strong talent support and intellectual guarantee for the high-quality development of China's digital economy and the construction of a technological power.

Disclosure statement

The author declares no conflict of interest.

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