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Research on the Impact of Artificial Intelligence on the Employment of Students in Vocational College

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Abstract: The industrial application of artificial intelligence (AI) technology is profoundly reshaping the global labor market landscape. As the core carrier for cultivating technical and skilled talents, vocational colleges face a dual situation of "opportunity reconstruction" and "risk intensification" in student employment. Based on the latest industry data, policy documents, and institutional practice cases, this paper systematically analyzes the impact mechanism of AI on the employment of vocational college students, exploring research from three dimensions: opportunity expansion, practical challenges, and collaborative response strategies. The results show that AI creates new opportunities for vocational college students by generating technology-applied positions, promoting vocational education reform, and expanding emerging employment channels. However, it also brings challenges such as accelerated job substitution, intensified skill mismatch, and escalated employment competition. The study proposes a four-dimensional collaborative strategy involving "school-enterprise-government-individual", including dynamic curriculum reform, deep integration of industry and education, precise policy support, and personal ability upgrading. The aim is to build a path for vocational college students to enhance their employment resilience in the AI era and provide theoretical reference and practical guidance for the high-quality development of vocational education.

Keywords: Artificial Intelligence; Vocational College Students; Employment Impact; Skill Matching Industry-Education Integration

1. Introduction

Currently, technologies such as generative AI, industrial robots, and intelligent decision-making systems are deeply penetrating into pillar sectors of the national economy, including manufacturing, service, and agriculture, driving the transformation of the labor market from being "physically driven" to "skills-driven". According to the "Future of Jobs 2025" report by the World Economic Forum, AI will fundamentally transform 133 million jobs globally, with 65% of the new job requirements requiring a composite ability of "technical operation + AI tool application". As the education type most closely linked to industry, higher vocational education cultivates "front line technical and skilled talents" who are not only the direct implementer of AI technology but also a sensitive group to job substitution risks. Against this backdrop, an in-depth analysis of the dual impact of AI on the employment of higher vocational students and exploring adaptive response paths are not only related to the career futures of tens of millions of higher vocational graduates but also involve the transformation and upgrading of the vocational education system and the implementation of the national strategy to build a powerful manufacturing nation. In recent years, scholars both domestically and internationally have conducted research on the relationship between AI and employment [1], but most of it has focused on groups with bachelor's degree or above, and research on higher vocational students, a group with specialized skills, is still insufficient. This study fills this gap by constructing a systematic framework for enhancing the employ ability of higher vocational students in the AI era through empirical data and case analysis.

2. New Opportunities Brought by Artificial Intelligence for the Employment of Vocational College Students

The implementation of AI technology not only restructures the industrial landscape but also opens up diversified employment paths for

vocational college students [2]. The opportunities are primarily manifested in three aspects: the explosion of technical application positions, the empowerment of educational reforms, and the expansion of emerging fields.

2.1 The Demand for Positions at the Technology Application Level has Surged, Aligning with the Skill Orientation of Vocational Education

The AI industry chain presents a pyramid structure of "research and development layer - application layer - service layer", with over 70% of the application layer positions highly aligned with the "technical operation" training objectives of higher vocational education.

With the in-depth promotion of "Made in China 2025", the density of industrial robots has increased directly, which has directly spurred the demand for positions such as "industrial robot system operation and maintenance personnel" and "intelligent production line debugging workers". According to data from the China Machinery Industry Federation, the national shortage of industrial robot operation and maintenance talents reached 420,000 in 2025, with 80% of the positions requiring a higher vocational education degree or above. Typical cases show that Shenzhen Polytechnic and ABB Group jointly established an "industrial robot order class", with courses covering modules such as "robot disassembly and debugging", "vision system application", and "AI fault diagnosis". Students are required to complete 1,200 hours of practical operation in enterprises. The average starting salary for graduates of the 2025 session reached 8,200 yuan per month, which is 35% higher than that of ordinary mechanical majors.

AI model training relies on high-quality annotated data, driving the explosive growth of positions such as "data annotators" and "AI trainers". These positions do not require complex programming skills, but demand industry knowledge and meticulous operations, becoming a "new blue ocean" for employment for vocational college students. By 2025, the data annotation market is expected to exceed 30 billion yuan, with a demand for 800,000 jobs, 60% of which are targeted at vocational college graduates. The integration of AI and the service industry has given rise to composite positions combining "technology + service", such as "AI customer service system operators" and "intelligent elderly care equipment technicians", requiring vocational college students to possess both traditional service skills and AI tool application capabilities to form differentiated competitiveness. Taking intelligent customer service as an example, despite a 50% reduction in traditional human customer service positions[3], the demand for "AI customer service trainers" has surged, requiring the optimization of the speech library through natural language processing tools, analysis of user intent data, and debugging of sentiment recognition models.

2.2 Accelerate Vocational Education Reform to Enhance Talent Adaptability

AI technology is forcing higher vocational education to transform from "traditional skills" to "precise talent cultivation in the intelligent era". Through curriculum reconstruction, practical training upgrading, and certificate integration, it systematically enhances students' employment competitiveness.

Over 80% of vocational colleges nationwide have initiated curriculum reforms [4], integrating AI elements into core courses. For instance, the mechanical manufacturing major has added modules such as "Industrial Robot Vision System Application" and "AI Quality Inspection Technology", requiring students to master machine vision software operation and defect recognition algorithm parameter debugging. The accounting major has introduced a course on "AI Financial Robot Operation", training students to use the UFIDA "Smart Star" system to complete automatic bookkeeping and tax declaration, achieving an efficiency improvement of 8 times compared to traditional manual operations.

Higher vocational colleges and enterprises have jointly established an "AI+ Training Center" to simulate real production scenarios and achieve integrated training through "virtual simulation + real operation". By 2025, the proportion of AI-related equipment in the national vocational education training equipment investment will reach 35%, an increase of 20 percentage points compared to 2020.

Higher vocational education has incorporated AI-related vocational skill level certificates into its talent cultivation program, achieving "alignment between course content and certificate standards, and alignment between teaching processes and job requirements". By

2025, the employment rate of higher vocational graduates holding certificates such as "Artificial Intelligence Trainer" and "Intelligent Equipment Operation and Maintenance" reached 92%, which was 30% higher than that of graduates without such certificates. The implementation paths include embedding certificates into courses and promoting learning through competitions: the former breaks down the five assessment modules of the "Industrial Robot System Operation and Maintenance (Intermediate)" certificate into 12 courses, and students can directly apply for the certificate after passing the course assessments.

2.3 Emerging Industries and Policy Support, Broadening Employment Channels

The combination of national strategic promotion and the dividends from industrial upgrading has created diversified employment opportunities for vocational college students, specifically manifested in the support of policy-related positions, the expansion of emerging fields, and the rise of flexible employment [5].

Targeted delivery of policy-oriented positions: The government has targeted the recruitment of vocational college graduates through projects such as "AI Assistance for Rural Revitalization" and "Digital Transformation of Small and Medium-sized Enterprises". For example, agricultural AI technicians are responsible for operating intelligent agricultural machinery and maintaining AI monitoring systems for crop growth, and they enjoy the policy of "3 years of grassroots service subsidies + bonus points for postgraduate entrance examination". County-level AI promotion personnel assist small and medium-sized enterprises in deploying AI tools, with training subsidies provided by the Ministry of Industry and Information Technology.

Job expansion in emerging fields: The integration of AI with fields such as new energy, smart agriculture, and the Metaverse has given rise to a plethora of positions suitable for vocational college students: AI operation and maintenance personnel for photovoltaic power stations in the new energy sector, and AI inspection technicians for energy storage batteries; motion capture technicians for virtual digital humans in the Metaverse sector. By 2025, the demand for these positions is expected to reach 100,000, with graduates from vocational colleges majoring in "Digital Media Application Technology" accounting for 60% of the workforce.

The rise of flexible employment forms:AI tools have lowered the threshold for self-employment and flexible employment. Higher vocational students can achieve employment through "receiving orders on platforms + monetizing skills". For example, they can undertake image annotation tasks on platforms such as JD Crowd Intelligence, provide AI system debugging services for home appliances through platforms such as "Luban Home", or use AI design tools and Jianying's intelligent editing function to provide marketing material production services for small and medium-sized enterprises.

3 Realistic Challenges Faced by Vocational College Students in Employment under the Background of Artificial Intelligence

Despite the significant opportunities, the "substitution effect" and "differentiation effect" of AI technology also pose multiple challenges for vocational college students, such as accelerated job substitution, intensified skill mismatch, and escalated employment competition [6].

3.1 The Risk of Job Substitution is Concentrated, and Traditional Advantageous Fields are Impacted

AI has a significant substitution effect on "repetitive, standardized, and low-skilled" positions, which are traditionally the employment frontiers for vocational college graduates. In the manufacturing industry, the widespread adoption of industrial robots and AI quality inspection systems has led to a significant reduction in traditional assembly, welding, packaging, and other positions. For example, Tesla's Shanghai factory has reduced battery assembly positions by 70% through the "4680 Battery AI Production Line". In the service industry, AI customer service, smart cash registers, unmanned delivery, and other technologies are replacing basic positions.

3.2 Skill Mismatch Intensifies, with Education Supply Disconnected from Industry Demand

Despite the reform of vocational education, the iteration speed of AI technology far exceeds the curriculum update cycle, resulting in a significant gap between student skills and enterprise needs. Enterprise surveys show that

68% of HR professionals believe that vocational college graduates "lack the ability to operate the latest AI tools," yet "e-commerce" courses in colleges still focus on traditional web design, and only 15% of colleges offer relevant AI modules[7]. Human capital theory points out that education is the core way to accumulate human capital, and when educational content cannot match the speed of technological progress, it will lead to "depreciation of human capital" and reduce the competitiveness of workers in employment. In addition, although vocational college students are good at "technical operations," they have shortcomings in deep application abilities such as "AI system optimization" and "solving complex scenario problems," which leads to vocational college students mostly engaging in "basic operations" in technical positions, and the proportion of them promoted to "technical supervisors" is lower than that of undergraduate graduates.

3.3 Employment Competition Intensifies, and Highly Educated Talents are Moving down to Lower-Tier Cities, Squeezing the Living Space of Others

Due to increasing employment pressure, graduates with bachelor's degrees or above have begun to penetrate traditional "high-level advantageous positions", squeezing the space for vocational college students with their advantages in "theoretical foundation + learning ability". Recruitment data in 2025 showed that the proportion of bachelor's degree graduates applying for industrial robot operation and maintenance positions reached 45%, an increase of 25 percentage points compared to 2020[8]. Some companies even raised their academic requirements from "college degree" to "bachelor's degree or above". Although AI data annotation positions have low entry requirements, bachelor's degree graduates account for 60% of high-paying projects due to their "high data processing efficiency and strong learning ability"[9]. Vocational college students are mostly assigned to low-unit-price basic annotation tasks. In addition, AI positions exhibit characteristics of "regional concentration" and "industry concentration", while vocational college students mostly come from third- and fourth-tier cities with limited family resources, making it difficult for them to support the cost of employment in different locations[10]. At the same time, the insufficient supply of AI positions in the central and western regions leads to "geographical mismatch in employment".

3.4 Insufficient Professional Cognition and Psychological Adaptability

Some vocational college students have a vague understanding of the employment environment in the AI era and a conservative mindset, further exacerbating their employment difficulties. According to the 2025 National Vocational College Students' Career Cognition Survey, 68% believe that "AI positions require programming talent", while only 23% actively take AI-related courses; 55% equate "AI-related positions" with "algorithm engineers", ignoring low-threshold positions such as "equipment operation and maintenance" and "data services"; 42% worry that "AI will replace all technical positions", leading to a negative mindset of "learning is useless". Traditional vocational education emphasizes "matched employment", and students have low acceptance of "cross-industry employment" and "flexible employment". For example, a student majoring in "computerized accounting" in a vocational college refused to transition to the position of "AI financial robot operation and maintenance" after the reduction of traditional accounting positions due to resistance to learning "AI financial systems", resulting in long-term unemployment; a student majoring in "mechanical manufacturing" gave up the offer of "AI equipment operation and maintenance" from a new energy enterprise due to fear of "cross-industry learning costs", insisting on seeking traditional machine tool operation positions, while the recruitment volume of such positions decreased by 40% year-on-year.

4. Collaborative Response Strategies for the Employment of Vocational College Students in the AI Era

In response to the aforementioned challenges, it is necessary to establish a four-dimensional collaborative mechanism involving "schools, enterprises, governments, and individuals", and systematically enhance the employment resilience of vocational college students through educational reforms, industry-education integration, policy support, and capability upgrading.

4.1 Schools: Educational Reform Centered

on "Precise Education"

Vocational colleges need to build a talent cultivation system tailored to the AI era from three aspects: dynamic curriculum adjustment, in-depth practical training upgrading, and intelligent employment services.

Dynamic course adjustment mechanism: Schools should establish an "AI+Professional" Development Committee, incorporating technical experts from enterprises. The syllabus should be revised every semester to ensure that the content is synchronized with industry technology. For example, Shenzhen Polytechnic and Huawei have jointly established the "Intelligent Interconnection Professional Group". Huawei engineers participate in 50% of the course design, incorporating the latest enterprise technologies such as "HarmonyOS AI Development Kit Operation" and "Edge Computing Device Debugging" into the curriculum. Modular course design is adopted, breaking down AI-related skills into "basic modules + professional modules (such as + expansion modules)". Students can flexibly choose courses according to their career planning and obtain a micro-certificate upon completing the required credits. AI-related courses undergo "minor annual updates and major triennial revisions", with teaching cases and practical training projects dynamically updated through enterprise feedback and industry reports.

Upgrading the "virtual and real integration" of the training system: Establish an "AI + Digital Twin" training center, where students can repeatedly practice high-risk and high-cost operations through virtual simulation technology that simulates complex industrial scenarios. The "Smart Ship Training Center" at Wuhan Shipbuilding Vocational and Technical College allows students to debug ship AI navigation radars through a digital twin system, simulate parameter optimization under extreme scenarios such as typhoons and electromagnetic interference, and enhance their practical skills by 60%. Implement "project-based training" by undertaking real-life projects from enterprises, where students participate in project-based training as "engineer assistants".

Intelligent transformation of employment services: Develop an "AI Employment Mentor" system that generates personalized career planning reports based on students' majors, skill certificates, and practical training experiences, while taking into account the job requirements of enterprises, and recommends suitable positions. Organize an "AI Job Training Camp" in collaboration with enterprises to conduct targeted training, and directly transfer graduates to enterprises upon completion. Implement "AI Career Awareness Education" through enterprise presentations, job experience days, and sharing by outstanding alumni, to dispel students' misunderstandings about AI jobs and stimulate their willingness to actively learn.

4.2 Enterprises: Taking "Industry-Education Integration" as the Core of Responsibility

Enterprises need to deeply participate in the cultivation of higher vocational talents from three aspects: talent standard setting, joint construction of training bases, and job training empowerment, in order to alleviate the problem of skill mismatch.

Participate in formulating talent standards: Leading enterprises should collaborate with colleges and universities, as well as industry associations, to issue "AI Technical Skill Talent Standards" that clearly define the "knowledge, skills, and qualities" required for specific positions. For example, the standards for the "intelligent equipment operation and maintenance position" should include knowledge, skills, and qualities.

Co-build "AI Industry College": Enterprises are deeply involved in the entire process of talent cultivation, achieving "enrollment as recruitment and graduation as employment". For example, Midea Group and Shunde Vocational and Technical College jointly established the "Midea AI Industry College". The enterprise invested 10 million yuan to build a training base and provided "enterprise curriculum packages". Students undergo internships in the enterprise during their third year and are directly employed after graduation. The average starting salary of graduates is 30% higher than that of ordinary majors. In terms of operational mechanisms, enterprises send "industry professors" to teach core technology courses, while college teachers practice in the enterprise to update their technical knowledge.

Provide "AI Skill Improvement Program": For in-service vocational college graduates, enterprises should carry out "upgrading from old to new" training to help them adapt to the needs of job upgrading. For example, the "AI Craftsman Training Program" of Haier Group

provides free training for vocational college graduates with less than 3 years of work experience, including "Industrial Internet Platform Operation" and "AI Energy Efficiency Optimization Technology". Those who pass the training will be promoted to "Intelligent Team Leader" and receive a 50% salary increase. The government provides subsidies for enterprise training to reduce the participation cost of enterprises.

4.3 Government: Ecological Protection Centered on "Policy Innovation"

The government needs to create a fair and sustainable employment environment for vocational college students by improving the skill training system, optimizing employment services, and strengthening algorithm governance.

Establish an "AI+Vocational Skills" training system: Establish national-level AI skills training bases, relying on higher vocational colleges and leading enterprises to build 100 national-level bases, providing standardized training with "equipment + teachers + courses"; promote the "new apprenticeship system", where enterprises train AI technical workers in the "mentor-apprentice" mode, and the government provides a subsidy of 6,000 yuan per person per year to enterprises. Apprentices enjoy a flexible learning system of "alternating work and study"; develop a "micro-certificate" system, launching micro-certificates for specific AI fields. Learners can obtain these certificates after studying and passing assessments on online platforms. These certificates can be accumulated to exchange for academic credits or professional qualification certifications.

Optimize employment services and guarantees: Build an "AI employment matching platform" to integrate enterprise job demands and student skill data, and reduce employment information asymmetry through precise matching via algorithms; improve flexible employment security by incorporating flexible employment such as AI data annotation and intelligent equipment operation and maintenance into the social security system, allowing "individual + platform + government" to jointly guarantee fees, eliminating students' worries; guide the balanced distribution of AI jobs across regions, and encourage enterprises to deploy AI application centers in central and western regions through policies such as tax incentives and land use guarantees, creating localized employment opportunities.

Strengthen the governance of algorithmic discrimination: The "AI Recruitment Algorithm Review Standards" have been introduced, prohibiting enterprises from setting labels such as "educational discrimination" and "school discrimination" in recruitment, and requiring the disclosure of algorithm logic and acceptance of third-party audits. A "fair employment complaint platform" has been established, where students can submit evidence and complaints if they discover that enterprises refuse to hire them due to algorithmic discrimination. The government will order the enterprises to rectify and make public apologies.

4.4 Individuals: Capacity Building Centered on "Active Upgrading"

Vocational college students need to proactively adapt to the employment requirements in the AI era from three aspects: optimizing their skill structure, transforming their career perspectives, and cultivating a lifelong learning mindset.

Build a composite capability of "core skills + AI tools". Deeply cultivate core skills and consolidate the advantage of "technical expertise", such as mechanical majors proficient in "disassembly, assembly, and maintenance of industrial robots" and accounting majors skilled in operating "AI financial software"; expand the application ability of AI tools, learn basic AI tools through "the lifelong learning platform of the Open University of China" and "open courses for enterprises", master Python data processing and Tensor Flow basic operations for technical majors, and master AI customer service platforms and intelligent marketing tools for service majors; obtain professional certificates, giving priority to obtaining high-value certificates such as "Artificial Intelligence Trainer" and "Intelligent Equipment Operation and Maintenance", to enhance the competitiveness of resumes.

Shift employment perspectives and embrace emerging roles. Pay attention to integrated positions of "AI + traditional industries", such as agricultural AI technicians, AI assistants for intangible cultural heritage inheritance, and intelligent sports equipment operation and maintenance personnel. Accept flexible employment and career transitions, utilize AI tools to lower the threshold for entrepreneurship,

or pursue cross-industry employment through "skill transfer". A graduate majoring in "numerical control technology" from a vocational college successfully joined a new energy enterprise by self-studying the "operation of AI monitoring system for photovoltaic power stations", with a salary increase of 40% compared to traditional positions.

Cultivate a lifelong learning mindset. Establish a "skills update checklist", regularly follow industry reports, identify new skills required for the position, and develop a learning plan; participate in internal corporate training, actively apply for AI-related projects after joining, and accumulate experience through "learning by doing"; utilize fragmented time to learn, obtain free tutorials on platforms such as Tiktok's "AI Skills" topic and Bilibili's "Higher Vocational AI Training" channel, study for 1-2 hours daily, and continuously enhance abilities.

5. Conclusion and Outlook

The impact of artificial intelligence (AI) on the employment of vocational college students is a combination of "creative destruction" and "opportunity reconstruction". In the short term, challenges such as job displacement and skill mismatch objectively exist. However, in the long run, AI provides vocational college students with higher-quality employment opportunities by spawning new professions, optimizing employment patterns, and promoting educational upgrading. The core finding of this study is that in the AI era, the employment competitiveness of vocational college students no longer relies on "specialization in a single skill", but rather shifts to a three-dimensional model of "core skills + AI tools + lifelong learning ability". Future research can further explore the differentiated impact of AI on vocational college students of different majors, or track and analyze the long-term effects of coping strategies through empirical research. With the deepening of technological iteration and educational reform, vocational college students are expected to grow from "passive adopters" of AI technology to "active leaders", injecting core impetus into the construction of a manufacturing powerhouse.

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