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Exploring Response Strategies for Higher Vocational Education under the Development Trends of AI-Induced Job Displacement Effects

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Abstract: This paper delves into the development trends of job displacement effects caused by artificial intelligence (AI) and explores strategies for higher vocational education to address these effects. Given the rapid advancement of AI technology, which poses potential risks of job displacement, the study highlights the uncertainties associated with AI's job displacement effects and the subsequent impact on the employment of graduates from higher vocational institutions. To effectively address this issue, the paper proposes fourteen strategies, including enhancing the quality of higher vocational education, fostering closer collaboration with businesses, and nurturing students' innovation capabilities. Furthermore, the paper discusses future research directions, such as labor market adjustments and restructuring, as well as skills demand analysis.

1. Introduction

The rapid advancement of Artificial Intelligence (AI) technology has profoundly impacted various fields. With improvements in data processing and computational capabilities, along with advancements in machine learning methods, many tasks once deemed impossible are now becoming reality. AI technologies have achieved significant progress in areas such as speech recognition, computer vision, and natural language processing, and are widely applied in smart homes, healthcare, finance, manufacturing, and more.

In November 2022, OpenAI's release of the ChatGPT model marked a major breakthrough in the field of artificial intelligence. With 175 billion parameters, pretrained on a corpus of 300 billion words, and deployed on Microsoft's Azure AI supercomputing platform with a total computational power of 3640 PF-days, ChatGPT stands out as one of the most sophisticated AI models. It excels not only in engaging in fluent conversations but also in creating novels, essays, music, poetry, strategic plans, and writing computer code—demonstrating high levels of creativity and skill.

The President of China, during a collective study session, emphasized the importance of artificial intelligence and highlighted the need to evaluate and mitigate its potential risks. He also called for

strengthening research on related legal, ethical, and social issues.

The rapid advancement of AI technology has significantly impacted the job market. While automation has replaced many traditional jobs, reducing employment opportunities, it has also created new roles in AI research, data analysis, and other emerging fields. To address these changes, society must focus on enhancing talent development and facilitating career transitions to adapt to the evolving job landscape.

This paper aims to elucidate the characteristics and patterns of AI-induced job displacement, understand its impact on the employment of vocational graduates, and propose effective intervention strategies for vocational institutions.

2. Literature Review

AI technology's rapid development is both innovative and disruptive, influencing employment across many sectors through job displacement, complementary effects, and creative effects. The job displacement effect, characterized by its disruptive, persistent, and expansive nature, has become a focal point for researchers globally.

2.1. International Research

In 1984, Nilsson [1] suggested that AI would significantly reduce the demand for human labor, leading to machine replacement phenomena. In 2013, David and Dorn [2], along with Goos et al. [3], found that AI usage polarizes the labor market, reducing the demand for medium-skilled labor. Frey and Osborne[4] predicted that by 2030, 35% of UK workers and 47% of US workers would be replaced by robots. The OECD's 2016 survey indicated that low-education jobs are more susceptible to AI displacement. PwC's 2017 forecast estimated job replacement rates by robots in the US, UK, Germany, and Japan to be 40%, 30%, 35%, and 21%, respectively. McKinsey's 2017 study projected an average global labor displacement rate of 15% by 2030 under moderate AI development scenarios [5].

2.2. Domestic Research

In 2020, researchers Qiu Yue and He Qin [6] proposed an integrated theoretical framework for analyzing AI's impact on employment in the Chinese context. They identified four key issues that displaced workers need to address to adapt to new job requirements. In the same year, researchers Cao Shouxin and Xu Xiaowen [7] suggested that increasing investment in education and training, encouraging innovation, improving relevant employment security policies, and formulating AI-related laws and regulations are effective ways to reduce the impact of AI on labor employment. In 2022, researchers Wang Xinyu, Xie Yu, et al. [8], based on data from the installation of industrial robots in China, used regression models to analyze and test the impact of AI technology on the total employment, wage levels, and quality structure of workers in Beijing.

In light of the job displacement effects of AI, some education scholars have begun to explore countermeasures for higher education institutions. In 2020, researchers Wang Chen and Ma Lian [9] conducted a survey on the perceptions and attitudes of finance students at a university in Shandong towards AI's impact on employment. They analyzed labor market changes under the background of AI and proposed strategies to enhance the employment quality of finance students, including developing three core competencies, establishing a tripartite linkage mechanism between industry, academia, and research, and enhancing the top-level design concept of lifelong education. In 2022, researchers Su Kangyou, Liu Guide, et al. [10], through the study and practice of AI industry talent cultivation systems, explored the paths for constructing AI-specialized programs and applied AI

talent training models. In 2023, scholars Fu Yunfang, Chen Yongxiao, et al. [11] found that the disruptive effects of AI technology on job mechanisms and demands are the direct causes of the increasing specifications for talent by enterprises. They proposed specific measures to enhance the employability of university graduates. In the same year, researchers Lv Fei and Liu Yadong [12] suggested exploring the integration paths of vocational education and AI, improving the basic infrastructure for AI, enhancing its application conditions, and actively promoting reforms to cultivate technical talents capable of advancing AI development.

3. Development Trends of AI Job Displacement Effects

An analysis of relevant domestic and international literature reveals that the job displacement effects of artificial intelligence (AI) are expanding, particularly reducing the demand for medium-skilled labor, with higher displacement rates in jobs requiring lower educational levels. The global labor displacement rate is expected to rise significantly in the future. In China, the labor force in the primary and secondary industries is particularly affected. To address the employment challenges posed by AI, higher education must adopt strategies such as improving workforce quality, encouraging innovation and entrepreneurship, enhancing public employment services, and reforming social security systems. Additionally, establishing industry-academia-research collaboration mechanisms, innovating talent cultivation models, and improving infrastructure are essential to enhance students' employability and adaptability.

However, research specifically targeting higher vocational education remains limited. Graduates from higher vocational institutions, being a vulnerable group among university graduates, are more susceptible to the job displacement effects of AI on vocational skills education. Given that generative large model technology represents the latest advancement in AI, current literature has relatively limited consideration of its development. This indicates a need for further research to fully understand and address the unique impacts of AI advancements on higher vocational education.

Against this backdrop, the paper "Sparks of Artificial General Intelligence: Early experiments with GPT-4"[13] by Microsoft Research provides a detailed evaluation of GPT-4's various capabilities, revealing its potential as a precursor to artificial general intelligence (AGI). The experiments demonstrate that GPT-4 exhibits knowledge generalization, deep understanding, and reasoning abilities, highlighting its promise as an emerging AGI model. Based on previous research findings and the technical characteristics of large AI models like GPT-4, we predict several development trends in advanced AI technology and their impacts on higher vocational education.

3.1. The "Black Box" Problem of AI Algorithms and Its Implications

Current large-scale AI models, comprising billions of parameters and trained on vast datasets, operate with complex internal structures and high levels of autonomy, often beyond human intervention. This phenomenon, known as the "black box" problem in AI research, results in unpredictable impacts, expansive influence, and sustained and uncertain consequences of AI job displacement. The intricacies of these models' operational mechanisms and outcomes pose significant challenges to fully understanding and controlling their effects. As model design optimizes, computational power increases, and data scales expand, the upper limits of these complex AI models' capabilities remain uncertain.

3.2. Risk of Replacing Skilled Mental Workers with Rapid AI Development

Unlike the third industrial revolution, which primarily affected manual labor, the current wave of

AI advancement threatens skilled mental labor. AI technologies, grounded in vast data sets and characterized by self-learning and self-optimization, pose replacement risks to workers across low, medium, and high skill levels. For instance, in the service industry, speech recognition technology can automate customer service and identity verification; in banking and finance, automated fraud detection can identify high-risk transactions; in the media, text generation can draft data-based documents; and in the biomedical field, machine learning models are widely used for drug interaction predictions, with some hospitals employing computer vision technology for medical imaging analysis.

3.3. Significant Impact on Employment of Vocational Graduates

Higher vocational education, distinct from undergraduate education, focuses on practical skill development rather than foundational theory, aiming to cultivate technically proficient professionals. Given this focus, vocational graduates possess strong practical abilities but often lack transferable and sustainable development skills. Currently, some vocational institutions' career guidance services are insufficient to address the rapid advancements in AI, and certain low-complexity and low-innovation fields face significant replacement risks. Consequently, the disruptive changes brought by the new technological and industrial revolution may profoundly impact vocational graduates from various disciplines. Vocational institutions must implement intervention measures based on their specific academic offerings, faculty capabilities, student training models, and local industry structures and societal needs. These measures will help graduates secure better employment opportunities, adapt to the rapidly evolving job market, and achieve sustainable development.

4. Strategies for Vocational Education Response

Research[14] indicates that artificial intelligence (AI) reduces the demand for conventional labor while increasing the demand for unconventional skills that are difficult to replace by AI, such as teamwork, self-directed learning, human-machine collaboration, and communication abilities. In response to the trends in AI-induced job displacement, this paper proposes the following strategies for vocational education.

4.1. Exploring the Establishment of a "Teacher-Student-Machine" Ternary Collaboration Model for Vocational Education

To effectively address the trend of job displacement caused by artificial intelligence, it is proposed to establish a "Teacher-Student-Machine" ternary collaboration model tailored for higher vocational education. This model integrates generative AI technology to achieve personalized learning centered on each student, with the primary goal of cultivating students' human-machine collaboration skills. Teachers play a crucial role in this process by ensuring "humans in the loop," capturing fleeting educational opportunities to ensure timely and targeted instruction. Additionally, this model innovatively incorporates ideological and political education into the curriculum, allowing teachers to flexibly introduce these elements to foster students' academic spirit and social responsibility. Teachers' involvement also mitigates potential risks associated with new technology applications, ensuring the safe and effective use of technology in education. Promoting this model can optimize the allocation of educational resources, bridging the gap between different regions and promoting educational equity, allowing more students to benefit from high-quality educational resources. In summary, the "Teacher-Student-Machine" ternary collaboration model for higher vocational education not only significantly enhances teaching effectiveness and student learning

experiences but also plays a crucial role in cultivating students' human-machine collaboration skills, promoting educational equity, and fostering social harmony.

4.2. Developing New Project-Based Textbooks Integrating Human-Machine Collaboration

This paper proposes the development of new project-based textbooks that integrate generative AI technology to achieve personalized learning and human-machine collaborative educational models, thereby enhancing teaching effectiveness and improving student learning experiences. These textbooks are designed to include practical projects that encourage interaction between students and AI systems, combining theoretical knowledge with hands-on practice. Utilizing AI-driven tools and resources, the textbooks offer individualized learning paths tailored to meet each student's unique needs and learning pace. The human-machine collaboration model not only supports technical applications but also ensures that students develop critical thinking, problem-solving, and innovation skills through their interactions with AI, thereby better preparing them to adapt to the rapidly changing job market.

4.3. Using Skills Competitions to Foster Students' Teamwork, Self-Directed Learning, and Other Unconventional Abilities

In higher vocational education, skills competitions serve as a high-intensity and challenging pedagogical approach that significantly enhances students' learning interest and overall competency development. These competitions are meticulously designed not only to test students' academic and technical skills but also to cultivate essential abilities such as teamwork, self-directed learning, and other unconventional skills that are difficult to foster through traditional teaching methods. In terms of teamwork, students are required to communicate effectively, allocate tasks, and coordinate efforts to achieve common goals during the competitions, thereby enhancing their collaboration and coordination skills. Self-directed learning is also emphasized as students must actively acquire knowledge, solve problems, and engage in innovative thinking to navigate the complex scenarios presented in the competitions. Participation in skills competitions allows students to continuously refine and elevate their comprehensive competencies in a realistic operational environment. This experience encompasses not only technical skills but also critical thinking, problem-solving, and innovation capabilities. Such practical experience is crucial for students' future careers, as it provides a solid foundation, enabling them to confidently and competently tackle various challenges in the workplace. In summary, skills competitions are a pivotal pedagogical method in higher vocational education, playing a vital role in enhancing students' academic and technical abilities while uniquely contributing to the development of teamwork, self-directed learning, and unconventional skills, thereby ensuring students' holistic development and professional success.

5. Conclusion

This paper delves into the job displacement effects brought about by the rapid development of AI technology, particularly its profound impact on the employment of vocational education graduates. By thoroughly analyzing relevant domestic and international research, this paper proposes a series of strategies aimed at enhancing the quality and adaptability of higher vocational education. These strategies include constructing a "Teacher-Student-Machine" ternary collaboration model that utilizes generative AI technology to achieve personalized learning centered on students; developing new textbooks that integrate human-machine collaboration to improve teaching effectiveness and student learning experience; and fostering students' interest in learning and developing their teamwork, self-directed learning, and other unconventional abilities through skills competitions.

These innovative strategies not only help to bridge the educational resource gap between regions and promote educational equity but also effectively address the challenges posed by the new technological and industrial revolution, enabling vocational education students to stand out in the AI era and achieve sustainable development.

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