

Research on the Path of Higher Vocational Talent Training in the New Era under the Background of Artificial Intelligence

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Abstract: With the advent of the era of artificial intelligence, it is difficult to rely on standardized education, and the development of The Times puts forward new requirements for talent training. The talents trained by higher vocational education in the new era should have the characteristics of growth mentality and high consciousness learning, human-machine symbiotic thinking and AI penetration skills, pioneering spirit and the ability to "break boundaries", the creative ability and practical wisdom, the combination of humanistic spirit and science and technology, human community thinking and cross-cultural action. Therefore, it is proposed that higher vocational education should focus on the target object of talent training in higher vocational colleges in the intelligent era, build a digital twin Sunac platform, form a new technology base, and develop new skills with the integration of industry and education certification. We are committed to cultivating the fertile soil for the growth of talents, and enabling the continuous emergence of high-quality skilled talents in the new era.

Keywords: Era of Artificial Intelligence; Higher Vocational Education; Talent Training Path.

1. Introduction

Talent is an important source of intelligence to accelerate the formation of productive forces and the basic driving force leading the development of productive forces. The development of productive forces needs to cultivate talents in the new era who are consistent with it, can make full use of production tools and produce innovative production value. Talents in the new era are also the decisive factor of the formation of new productive forces. They can adapt to the new round of technological change, master scientific and technological knowledge and skills, drive the high-tech labor materials and objects, and then create new labor materials to promote industrial upgrading and technological breakthrough. Education shoulders the important mission of advancing the future talent training, and cultivating talents in the new era is the due meaning of the era of digital wisdom. Therefore, understanding the development characteristics of artificial intelligence, grasping the core requirements of current social development for talent training, discussing the characteristics of talents in the new era and new ideas of artificial intelligence empowerment is the path choice to accelerate the development of productivity, and the problem that must be responded to in the theory and practice of talent training in the new era.

2. Development and Application Principles of Artificial Intelligence

2.1. Development of Artificial Intelligence Technology

With ChatGPT fire out of the circle, Sora, Wenxin Yiyan, Midjourney, FireFly, and other innovative AI products appeared, the AI storm set off by the Internet has swept every corner of the world. What exactly is an AI? Why is it so powerful? AI (Artificial Intelligence, AI): AI is a branch of computer science, dedicated to making machines simulate

human thinking, perform learning, reasoning and other work. The origins of AI can go back to the Dartmouth Conference in the 1950s. In the 1960s, a rule-based AI system that simulated the knowledge and experience of human experts emerged as expert systems to solve specific domain problems (including DENDRAL and MYCIN). In the 1990s, deep learning became the main research direction in the field of artificial intelligence. Deep learning is a machine learning technology based on neural network, which can process large amounts of data and automatically extract features for use in image recognition, natural language processing and other fields. Representative deep learning algorithms in this period include convolutional neural networks, recurrent neural networks, and deep belief networks. In the 2000s, the development of cloud computing and big data technology provided more data and computing resources for the application of artificial intelligence, and promoted the development of artificial intelligence. Representative cloud computing and big data technologies during this period include Hadoop, Spark, and TensorFlow. In the 2010s, artificial intelligence technology was widely used in various fields, such as autonomous driving, smart home, medical and health care, etc. Representative AI applications during this period include Google's AlphaGo, Apple's Siri, and Amazon's Alexa. In the 2020s, natural language processing and computer vision technologies were further developed. In natural language processing, a series of new technologies have emerged, such as pre-trained models such as BERT, GPT and T5, as well as generative models such as GPT-3 and GPT-4. In computer vision, a series of new technologies have emerged, such as target detection, image segmentation, and image generation.

In addition, autonomous driving technology has also been further developed. In terms of perception, more accurate and reliable sensors and algorithms appear, such as lidar and deep learning algorithms. In decision making, more intelligent and efficient decision algorithms appear, such as reinforcement learning and deep reinforcement learning. In terms of control,

more accurate and safe control algorithms appear, such as model prediction control and non-linear control. In addition, quantum computing is maturing in the 2020s. Quantum computing is a computational model based on the principles of quantum mechanics, which can handle large-scale data and complex computational problems and is suitable for artificial intelligence. Researchers are exploring how to use the advantages of quantum computing to accelerate machine learning and deep learning algorithms, and how to use artificial intelligence technology to optimize the performance of quantum computing.

2.2. The Implementation Principle of Artificial Intelligence

From the perspective of the development process of intelligence, computing power, data quantity and algorithmic model are the three major elements of artificial intelligence.

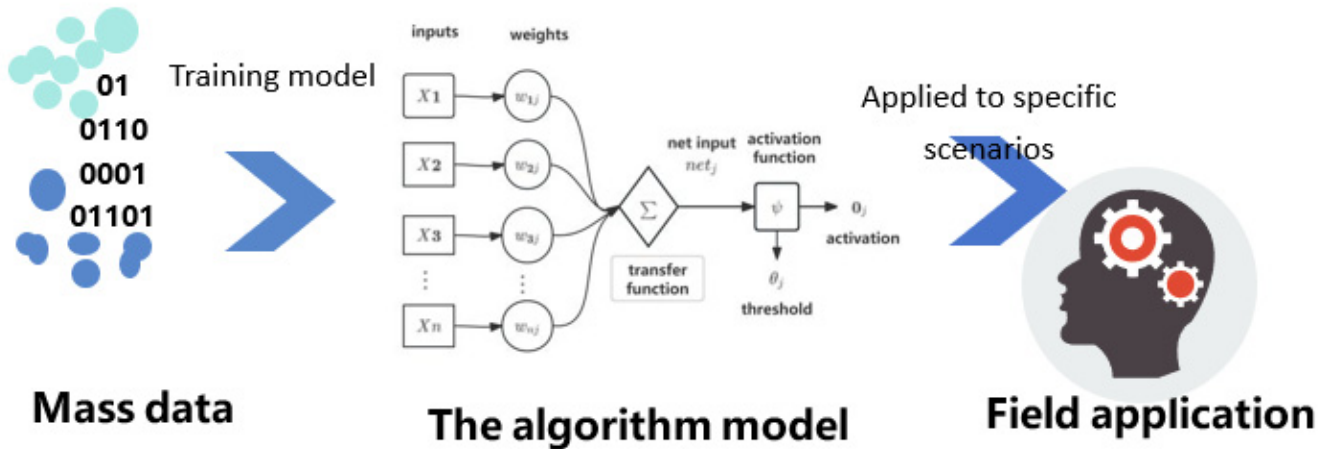


Fig 1. The implementation principle of artificial intelligence

3. Requirements for the Training of Higher Vocational Talents in the Era of Artificial Intelligence

3.1. The Relationship between Productivity and the Cultivation of Talents in Higher Vocational Education

The history of scientific and technological revolution and the development of productive forces shows that it is a universal law to rely on scientific and technological innovation to promote the rapid development of productive forces. The development strategy of productive forces is the key to China's advantages in the fierce global competition in the new era. It is an inevitable requirement for realizing high-level scientific and technological independence, seizing the commanding heights of development, cultivating new competitive advantages, accumulating new drivers of development, and entering the leading innovative country. Form and develop new types of productive forces rely on high-tech science and technology, high-quality labor force and high-quality means of production, and independent research and development of high-tech science and technology and production of high-quality means of production, relying on the high-quality labor force cultivated by the high-quality education model.

At present, the productive forces in the era of digital intelligence provide sufficient material basis for the development of education and fully release the efficiency of

As shown in Figure 1, the implementation of specific applications of artificial intelligence, such as speech recognition and image recognition, needs to give the machine certain reasoning ability before it can make reasonable actions. This reasoning ability is derived from a large number of application scenario data sets. By using a large amount of data to train the algorithm model, the machine can lay a solid foundation for human-like intelligent judgment, decision and behavior according to the algorithm. Artificial intelligence spirals up in the process of gradually developing and improving its own theories and methods, as well as seeking external power. From the proposal of Turing test theory to the automatic driving of driverless cars on the road, and the safe transition from the "closed world" in the laboratory to the "open world" in the outside, big data, cloud computing and deep learning have jointly contributed to the breakthrough of artificial intelligence.

education. However, the educational forms and concepts left over from the industrial era are no longer suitable for the iterative development of productive forces, and the standardized and homogeneous goal of talent training lags behind the needs of the development of productive forces. The essence of innovation-driven is talent-driven. The development of productivity needs the strong support of a large number of innovative talents, and the education system is in urgent need of cultivating innovative talents for the industry. Talent is the main body force to promote the formation of productive forces. The development of science and technology depends on high-quality talents. Only when science and technology is transformed from the form of knowledge to production tools can the means of labor become real material productivity. This transformation process should realize [1] by improving the quality of workers. Human beings are the most active and decisive active subject in the generation of productive forces. Without the jump of human capital, there will be no productive forces, and talent training is the decisive factor of the generation of productive forces. The training of higher vocational education talents in the new era needs to be able to understand the current situation of social development and have creative thinking, to integrate the complex system of society and have complex thinking, to actively adapt to the development of new technology and have technical thinking. Only by improving the quality and skills of higher vocational students and cultivating high-quality talents who are suitable to the development of modern science and technology and social productive forces and meet

the needs of the productive forces in the new era can we better help to promote the promotion of Chinese modernization.

3.2. Requirements for the Training of Higher Vocational Talents in the Era of Artificial Intelligence

The talents needed to be trained in the future of higher vocational education in the new era are high-quality skilled talents who can make full use of modern technology, adapt to modern high-end advanced equipment, and have the ability of rapid iteration of knowledge. Should not only master rich in basic scientific knowledge and have good quality, with patriotism, cooperation, social responsibility and will quality, also need to have creative thinking, social responsibility, more should pay attention to the breadth and multidisciplinary fusion, is for the new industry (strategic emerging industries and future industry) development service talents. In the process of higher vocational personnel training, learning is not only the accumulation of "1 + 1 + 1" type of simple technical knowledge, but also the multiplication of "2,3,4" and even exponential transition on the basis of comprehensive ability, to change the production and life style with innovation and high efficiency, and become an important driving force [2] in the new era. The training of higher vocational talents needs to adhere to the macro vision and system thinking, take intelligent penetration, the integration of science and education as the main line, adhere to the whole chain, all-round integration, upper and lower connection and horizontal and orderly connection.

3.3. Characteristic Analysis of High-Quality Skilled Talents

Intelligent age, higher vocational college training high-quality skilled personnel requirements is different from the simple repetitive physical labor ordinary skilled talents, need through continuous growth mentality and high consciousness learning characteristics, have strong man-machine coordination ability, humanistic spirit and science and technology cooperation, through pioneering spirit and cross-border learning ability, reveal creative ability and practical wisdom, and establish human community thinking and cross-cultural cooperation ability (as shown in figure 2).

3.3.1. Learning Consciousness and Growth Mentality

Growth mentality (Growth Mindset) is the heart source power for people to pursue excellence through unremitting learning. The purpose of learning is to build a future-oriented learning power, so as to help them form a continuous adaptation [3] to the future infinite object in the process of understanding the current limited object. High-quality talents with growth mentality, willing to mobilize their own higher order level of consciousness, understanding and transformation of the outside world, formed to technology continuous change need new knowledge system, internalized into a specific mental structure, to solve the strategic emerging industries in the new productivity, the future industry brings new unknown problems, high consciousness of learning, and have "learning" for the future.

3.3.2. Human-machine Collaboration Capability

AI has a wide range of penetration, namely the ability to integrate AI technology with their respective businesses, high human-machine team (Human-Machine Teaming) collaborative operation and interpersonal collaboration innovation ability. Higher vocational colleges to cultivate

high-quality skilled talents is not only the technology users, and is the technology innovators and promoters, with the technology and specific industries or field business integration ability, can identify which workflow can be optimized through the AI, how to integrate AI into the existing work, and how to deal with the change of AI, so as to promote the innovation of the industry transformation. Talents in higher vocational colleges can not only deeply cooperate with machines, but also form an efficient cooperation and co-creation mode with personnel or organizations from different backgrounds and fields through the digital intelligence platform, integrate different resources and skills in the team, and promote cross-field cooperation and innovation [4].

3.3.3. Action Force of Humanistic Spirit and Science and Technology

Higher vocational students are not only practitioners of technology, but also guardians of ethical and humanistic values. When designing and applying AI, they can follow the principles of people-oriented, improving human well-being, fairness and avoiding prejudice, and can conform to moral ethics, humanistic value and ecological development concept. In scientific and technological innovation, they not only pursue the improvement of technological efficiency, but also commit to meet ethical standards, such as not violating personal privacy, not exacerbating social inequality, and pay attention to the healthy and sustainable development of the ecosystem, to ensure the coordination of technological innovation and environmental protection. The action force of science and technology cooperation not only reflects a deep understanding of the responsibility of modern science and technology, but also represents a multi-dimensional and systematic technology development strategy, aiming to achieve the balance between technological innovation and social ethics and environmental sustainability, but also a forward-looking guidance for the future social development direction.

3.3.4. Pioneering Spirit and the Ability to "Break Boundaries"

The concept of "breaking boundary" (Breaking Boundary) includes expansion (Expanding Boundary), crossover (Cross-boundary) and crossing (Transcending Boundary). The "boundary" here not only refers to the boundary of subject knowledge, but also includes the boundary [5] of different methods, cognition, stages and systems. "Broken" ability can be regarded as an open mode of thinking, to agile perception and find high value goals and create new development opportunities, with the pursuit of innovation, the boundary challenge and reconstruction courage, as well as the future, by breaking the traditional discipline, knowledge boundaries, create unprecedented solutions and innovation.

3.3.5. Innovation Ability and Practical Wisdom

As a combination of creativity and imagination, creative ability requires talents trained by higher vocational education to not only see the current situation of things, but also foresee the possible development trend in the future, and new viewpoints and methods are put forward to solve problems and innovate practices. Practical wisdom can enable individuals to develop the right solution at a specific moment according to the situation, and change their behavior at any time according to the needs, so as to achieve the expected goal. Number wisdom times, the public faces increasingly complex problems, higher vocational education training talents need to

play a creative ability breakthrough thought set, through the analysis of existing information and problems, to predict the future risks and problems, and based on the analysis of risk aversion and strategy thinking, and wisdom of existing problems.

3.3.6. International Vision and Cross-Cultural Action Force

In the context of economic globalization, human destiny community, higher vocational education training talents need to have beyond the geographical limitations of vision and wisdom, constantly expand their international vision, international resources, the accumulation of internationalization, as well as the ability of international cultural understanding [6], and in different cultural background of individual or team to establish effective communication and collaboration. They should have a human community thinking emphasizes beyond national boundaries and cultural differences of global perspective, make its good at listening and understand different cultures and values, tolerance and resolve national differences and conflicts, and can uphold the high sense of responsibility and moral standards, promote sustainable development and social equity, with a broader global cognition and control ability, explore the global common solution to the problem.

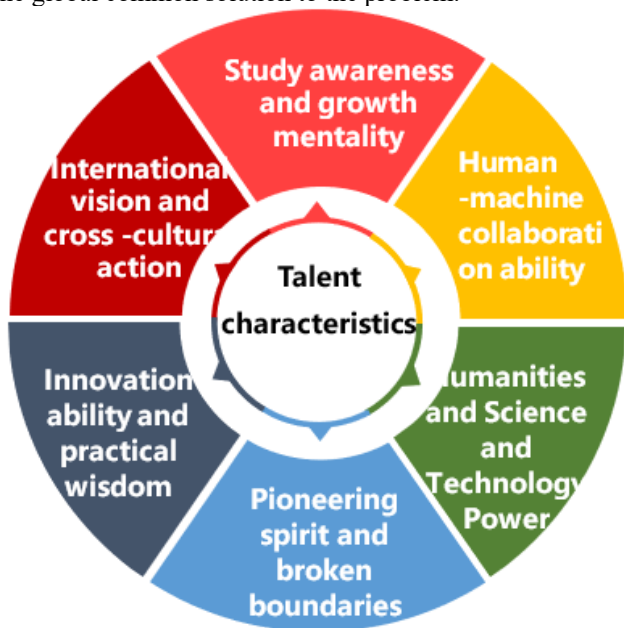


Fig 2. The characteristics of higher vocational talents in the new era

4. Strategies of Cultivating Higher Vocational Talents under the Background of Artificial Intelligence

The establishment of digital twin platform and the development of new quality skills and skilled talents through the integration of industry and education certification are valuable resources for the implementation of the strategy of strengthening the country with talents and innovation-driven development. A new round of scientific and technological innovation has spawned strategic emerging industries and future industries, bringing the upgrading of the training objectives of new quality skills, and driving the circular upgrading and spiral of the key links of vocational education and personnel training.

4.1. Focus on the Target Object of Talent Training in Higher Vocational Colleges in the Intelligent Era

In the short term, generative artificial intelligence gives teachers and students a new digital identity, also accelerated the vocational education skills training and enterprise rotational practice from real physical space to the transition of immersive virtual environment, and general big model of technology development in providing vocational education teaching auxiliary services, will inevitably lead to individual, including students and teachers, to become intelligent technology of computing object and governance goals. At present, the core goal of the teaching reform of higher vocational colleges in the intelligent era is to break through the barriers between school teaching and positions in enterprises and industry, and to meet the realistic needs of enterprises, schools, teachers and students [7]. The development, so to speak, the change of higher vocational college teaching in the age of intelligence is to serve the overall goal of vocational quality development, break the classroom boundary and school walls and promote vocational college learners cooperative learning, independent in personalized learning, to better meet the personalized needs of different industry skills learners and growth goals, to promote the future skilled personnel to adapt to and qualified for the sustainable technology revolution and industrial change process, and can assign the construction of a skilled society. In this regard, First, to promote the two-way flow of engineering and technical personnel, highly skilled talents and vocational college teachers through the intelligent transformation of higher vocational college teaching, And from the perspective of system design to improve the practical effectiveness of serving learners with different skills; Second, to promote the information sharing between higher vocational colleges, enterprises, industry organizations and the government through intelligent connectivity, Such as smart learning, skill certification, learning monitoring and policy supervision, To build a teaching ecosystem with the extensive participation of multiple subjects; Third, to break the inertia thinking of talent training in higher vocational colleges, Under the opportunity of the development of generative artificial intelligence, establish and improve the modern vocational education system that serves lifelong learning for all, Expand the teaching target object to the whole society, Thus strengthen the governance ability of higher vocational colleges to participate in the construction of skilled society. The development of triple target degree can be understood as towards cognitive stage of artificial intelligence technology and the integration of higher vocational colleges teaching development, and for civil society, including vocational college learners, to provide skills training and practice services, this will help to form including higher vocational colleges, enterprises, government and society, teaching community [8]. On the whole, the goal of teaching reform in higher vocational colleges in the era of digital intelligence is to establish a matrix structure integrating college level, industry, government and society, and to serve the personalized needs of skill learners and even the whole people in skill learning.

4.2. Build a Digital Twin Sunac Platform to Form a New Technology Base

As a key technology towards the digital and industry 4.0

strategy, the digital twin is a dynamic digital or virtual replication of physical assets, products and systems. In order to better promote vocational education middle scenario, financing, training process hitting, can build digital twin melting platform, based on physical space simulation form dynamic simulation model, docking entity manufacturing system, receive real-time information simulation analysis, through real-time communication and collaboration with human to make a wise decision. On the one hand, it provides students with realistic production scenarios, carries out intelligent production, knowledge learning and skills in the virtual model, provides fault tolerance and regulation, avoiding space; on the other hand, the visual presentation of the students' interactive learning and experience process, which makes the work in the twin space. Khakifirooz et al. Put forward intelligent manufacturing environment based on intelligent interaction "net letter-physical-social" space (CPSS), through sensors and actuators, robots and computing engine interconnected elements network network and the physical world, build a new melting base, realize knowledge driven (knowledge sharing), data driven (man-machine data sharing), model drive (machine together) and communication drive (human-machine collaborative decision) decision support [16]. At present, many international vocational colleges make the use of digital twin platform to promote the training of skilled personnel. For example, Danish Aarhus School of Ocean and Technology and Engineering has the help of digital twin modeling software Experior to guide students majoring in ship and automation engineering to program, simulate mechanical configuration and debug automatic production lines. The Copenhagen School of Ocean Engineering and Technology Management has built a digital twin learning factory in the field of intelligent manufacturing. Students have experienced "virtual modeling of physical system- -controller generation, code development- -virtual debugging- -code verification- -deployment", etc., to reduce the time required for manufacturing factory debugging [8].

4.3. Linkage and Industrial Cooperation in Vocational Education Development, and Strengthen the Practical Training of New Skills

To build a resilient and forward-looking vocational education talent training mode for the era of digital intelligence, we need to link the development of vocational education, promote production and teaching assistant, and can be considered from four aspects: industrial demand, outline planning, training activities, evaluation and certification. First, continue to understand the constantly updated skills needs of emerging industries and future industries, and determine the key skills needed by high-quality skilled personnel. Second, industry and education jointly plan the teaching syllabus for skills development, formulate a series of skills training courses, and encourage vocational colleges to link enterprises, universities and social institutions to design and adjust teaching plans. Third, integrate working scenes and school scenes, provide training activities and industry information, on the one hand, map academic content to real workplace, combine real tasks with classroom teaching, invite enterprise experts, university professors and government personnel to provide professional skills training, provide the latest industry information from different perspectives; on the other hand, encourage students to enter real workplace to experience learning, including field observation, simulation operation or

training, so as to apply skills in real work scenes. Fourth, school-enterprise cooperation realizes the common recognition of course certificates. Vocational colleges and corporate partners jointly supervise and evaluate students' learning process and results, and try to explore the certification mechanism of course learning and enterprise work level. Currently, Many vocational colleges in China explore various modes of production and education integration, For example, Tianjin Vocational University has a close cooperation with local high-end equipment manufacturing enterprises, Formed an "order-type" talent training mode, To provide talent accumulation for the local intellectual resources and technical resources; Shenzhen Vocational and Technical College, together with Huawei ICT College, Provide an important reference for the training of ICT technical skills personnel, By co-building ICT professionals and co-cultivating ICT talents, Carry out personalized learning and advanced training, To realize the interaction between school curriculum and enterprise certification, The course content serves the ICT industry chain, The course system seamlessly connects to the Huawei certification system, Form the talent training mode of "curriculum certificate symbiosis and longevity" [9].

4.4. Implement the Skill Stack Authentication Method to Achieve New Capability Advancement

In the process of training high-quality skills, individuals will acquire a set of special skills. If these skills are stacked together to form a personalized skill set (i. e. skill stack, Skill Stacking) and can be applied in different work scenarios, they will stand out in the collective. When an individual successfully completes a certain skill learning, forms a specific skill and successfully passes the assessment, he can obtain the skill micro-certification. When certification is a series of certificates recognized by the industry, these certificates can be accumulated over time to demonstrate the individual's expanded knowledge and ability, help them make progress on the career path, and at the same time obtain certificates recognized by the labor market, increase individual value and opportunities to obtain high-paying jobs. There are many different ways of skill stack authentication, and individuals can customize their career path on demand. The Association of Medical Technical Experts (AMT) provides three skill stack certification methods, including horizontal enhancing skills by obtaining additional professional certification or participating in assessment-based certification courses, with assessment-based duties or additional professional certification by a specific skill combination; vertical climbing career ladder for additional training or education certification, and the hybrid horizontal and vertical stacked combination certificate [20]. When learners complete certification consistent with required skills and employment opportunities, they can continue their education while obtaining entry-level employment qualifications in the selected occupational areas. The three skill stack certification methods provided (take doctors for example), in short, cultivating high-quality talents should be predictable, overall, and run through the whole process of education. Education departments at all levels and of all types should shoulder the major mission of cultivating talents in the new era, clarify their respective priorities, and form the situation of new quality talents, such as the construction of AI enabling education platform, the reconstruction of curriculum

system, and the reform of education quality evaluation.

5. Conclusion

In the process of promoting the rapid development of education informatization, higher vocational colleges have not kept up with the pace of the development of artificial intelligence in the process of talent training. There are still many specific problems worth discussing and need to be solved urgently. For example, the training of AI algorithm model requires open educational big data, but it will involve information security issues such as personal privacy exposure; the application of related technologies in teaching and examination may require the simultaneous improvement of policies and systems; to improve the teaching efficiency and promote educational equity, whether AI will also cause the increase of the digital divide; and how the future teachers and students, educational research, education management and planning should adapt to the many changes brought by artificial intelligence. In the face of the global intelligent development trend and its challenges, higher vocational colleges must actively adjust their own development, with the advantages and potential of existing technology, and truly serve the function of social and economic development.

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