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Article

The Method and Significance of Implementing the "Three Certificates" Teaching Model in Applied Undergraduate Colleges and Universities

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Abstract: Applied talent is not only a builder of human civilization but also a promoter of economic development. They not only need systematic and solid engineering theoretical knowledge but also rich engineering practical experience. Applied undergraduate colleges are the cradle for cultivating applied talent and shoulder the important mission of cultivating various types of applied talent for society. With the rapid development of higher education, the number of applied undergraduate institutions has sharply increased, but the quality of applied talent cultivated by them has shown a significant decline, which greatly restricts the pace of industrial development in the world. This article proposes a new concept of promoting the "three certificates" (graduation certificate, degree certificate, and skill certificate) education model in applied undergraduate colleges, which is of great significance for the country to cultivate composite talents with the ability of "product design, production management, and product processing" at the same time.

Keywords: applied talents; higher education; "three certificates" education model; engineering practical ability

1. Rduction

Applied talent refers to a specialized type of talent that can apply professional knowledge and skills to the professional social practice they engage in. They not only need to master solid engineering theoretical knowledge but also have rich engineering practical experience. Since the 1980s, countries around the world have increasingly attached importance to the cultivation of applied talent, and emphasizing practical teaching and strengthening the cultivation of applied talent has become a new trend [1]. With the rapid development of the global economy, many countries have fully realized the importance of applied talent in industrial development, and have therefore attached greater importance to the cultivation of applied talent. In 2017, the National Development and Reform Commission and the Ministry of Education of China decided to select 100 application-oriented universities in various provinces during the 13th Five Year Plan period to promote the construction of engineering application-oriented universities. From the central budget during the 13th Five-Year Plan period, it is planned to invest 100 million yuan in each university to achieve a combination of university industry and education with school transformation, and effectively shift the focus of education to serving local economic and social development, integrating industry and education with school enterprise cooperation, and cultivating application-oriented and technically skilled talent [2].

Applied talent is the main force of a country's economic construction and the driving force of industrial development, shouldering the responsibility of applying professional knowledge learned to industry development according to national needs. Although different majors have varying theoretical knowledge and practical engineering content, society has consistent quality requirements. All sectors of society unanimously believe that a qualified applied talent should possess the following

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two abilities: the ability to apply professional theoretical knowledge to engineering practice and the ability to discover and solve engineering problems.

2. Problems in the Current Cultivation of Applied Talents

Applied undergraduate colleges are the carriers of cultivating applied talent and shoulder the responsibility of cultivating various engineering and technical personnel for national economic construction [3]. To meet the demands of society for applied talents, many countries have issued a call to increase the cultivation of applied talent, and a large number of ordinary undergraduate colleges and universities have shifted towards applied talents [4]. In theory, with the increase in national attention and the number of participating universities, there should be a phenomenon of improving the quantity and quality of applied talent. Surprisingly, in recent years, there has been a significant increase in the quantity of applied talent cultivated by universities, but a significant decrease in quality. This is manifested in the following four aspects.

2.1. Lack of Solid Professional Theoretical Knowledge

The process of cultivating applied talent is an alternating cycle between the learning of professional theoretical knowledge and the cultivation of practical engineering abilities. While learning professional theoretical knowledge, students apply the learned professional theoretical knowledge to engineering practice and continuously enrich their professional theoretical knowledge by identifying problems in engineering practice. By combining theory with practice as a scientific learning method, we aim to enhance the engineering quality of applied talent [5]. The relationship between professional theoretical knowledge and engineering practical ability belongs to the relationship between "theoretical foundation" and "superstructure", and it is also a complementary and mutually reinforcing relationship. Only by mastering solid professional theoretical knowledge can one mention the ability to apply the learned professional theoretical knowledge to analyze and solve problems in engineering practice. Therefore, solid professional theoretical knowledge is a basic condition for becoming an applied talent.

With the rapid development of science and technology, the manufacturing industry has risen from traditional manual manufacturing to automated manufacturing and is now on the path of transformation towards digitization and intelligence. Professional theoretical knowledge is constantly being updated with the advancement of production methods, and the breadth and difficulty of professional theoretical knowledge are also increasing with the improvement in the manufacturing level. The requirements for students' learning ability are naturally becoming higher and higher. Correspondingly, with the popularization of higher education, the admission rate of college entrance examinations has been increasing annually, leading to a downward trend in the quality of students in applied undergraduate colleges. This has resulted in a contradiction between students with declining learning abilities and those with increasingly difficult professional theoretical knowledge. Through research on employers, we found that students trained in application-oriented undergraduate colleges generally lack solid professional knowledge, mainly because of their lack of ability to apply professional theoretical knowledge to discover, analyze, and solve problems in engineering practice.

2.2. Insufficient Engineering Practice Ability

Engineering practical ability refers to the ability of students to apply professional knowledge to analyze and solve engineering problems. Requires students to possess necessary engineering literacy and awareness while possessing practical abilities [6]. The cultivation of practical engineering ability depends on the learning attitude of students towards practical teaching content and completeness of practical school teaching resources. Training to enrich practical engineering skills requires students to have a desire to engineer practical knowledge and a comprehensive practical teaching platform. A student who is full of desire for engineering practical knowledge does not have complete teaching resources, just like "a good seed does not have a suitable soil for its growth"; Perfect teaching

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resources are aimed at students who are lazy to learn practical knowledge, just like "fertile land becomes a desert without cultivation.".

Currently, with the changes in the outlook on life and values of young people, there is a lack of the traditional thinking of "self-sufficiency and glorious labor" in the minds of the previous generation. They believe that the learning of engineering practice will face hard work and tiredness, and naturally lose the initiative to learn, let alone enthusiasm to learn. Teaching resources included faculty and teaching facilities. The cultivation of applied talent cannot be separated from teaching resources, which mainly include faculty with rich engineering practice experience and superior teaching facilities. However, with the intensification of the transformation from application-oriented universities to research-oriented universities, a shortage of engineering practice teaching resources has become a common phenomenon in most application-oriented undergraduate colleges. Therefore, in the context of education, where students are lazy to learn and teaching resources are severely scarce, students cultivated by applied universities will naturally have insufficient engineering practical abilities.

2.3. Weak Awareness of Teamwork

Marx points out that "the essence of human beings is not an inherent abstraction of individual individuals. In reality, this is the sum of all the social relationships." [6] In this society, no one exists as an individual or as an ordinary member of a team. A team exists to achieve a certain goal that requires the joint efforts of multiple team members to achieve and complete. In the process of achieving goals, each team member needs to have a sense of teamwork, and through sincere unity, the team can become a cohesive group, thereby enhancing its combat effectiveness and competitiveness.

Currently, most young people are only children in their families who are highly favored by their parents during their growth process. They have developed a personality trait of "taking care of themselves" in family life and have a selfish and self-centered personality in society. Causing it to become an isolated individual in social activities due to "unwillingness to cooperate with others" and "not knowing how to cooperate with others." After observation, we found that most students trained in application-oriented undergraduate colleges lacked a sense of teamwork in engineering practice, which was mainly reflected in the lack of basic trust among team members and their unwillingness to communicate and interact with each other. When faced with problems, they tend to be self-centered and avoid responsibility, and when faced with difficulties, they lack the spirit of teamwork and sharing weals and woes. Consequently, the team ultimately collapsed because of a lack of combat effectiveness in market competition.

2.4. Loss of Innovation and Entrepreneurship Motivation

The concept of entrepreneurship education was proposed at the International Symposium on Education for the 21st Century held by UNESCO in Beijing in 1989, and includes the cultivation of pioneering spirit, adventurous spirit, entrepreneurial ability, independent work ability, interpersonal communication, professional skills, and organizational management qualities [7]. In 1998, UNESCO officially proposed the concept of innovation and entrepreneurship education at the World Conference on Higher Education. Its core proposition is to strengthen the cultivation of students' innovation and entrepreneurship awareness, character, and ability based on social needs; cultivate their comprehensive quality and core competitiveness; and adapt to the needs of economic and social development [8]. The essence of innovation and entrepreneurship education is not simply "innovation education+entrepreneurship education", but a transcendence of the original meanings of the two. Innovation and entrepreneurship education is not the intersection of innovation and entrepreneurship education but the emergence of a higher-level, complete, and innovative concept.

The core of innovation and entrepreneurship education is to cultivate the spirit of innovation, entrepreneurial awareness, and entrepreneurial ability of college students. However, most undergraduate colleges and universities cultivate students who do not have a clear understanding of innovation and entrepreneurship. Innovation is the responsibility of enterprises, and

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entrepreneurship is the dream of young people with aspirations. They are only students in the "ivory tower, " who "do not listen to things outside the window and only read books of sages." The cultivation of applied talents requires professional mentors to provide them with professional knowledge, learning methods, and career guidance so that students can fully understand the nature of the profession they are learning and the social responsibilities they will need to undertake in the future during the learning process. Due to the fact that most application-oriented colleges and universities have not yet realized the importance of professional mentors in talent cultivation, students do not know what innovation and entrepreneurship are and how to innovate and start their own businesses during the learning process. Therefore, under the influence of students' incorrect outlooks on life and the unscientific education system of universities, most students trained by applied undergraduate colleges lose their motivation for innovation and entrepreneurship.

3. Analysis of the Causes of the Problem

3.1. The Constraints of Traditional Ideological Concepts on the Cultivation of Applied Talents

After thousands of years of sedimentation, feudal ideology has penetrated the minds of the people. In the eyes of the people, especially the elderly, the training goals and evaluation standards for talents still remain in the feudal society's ideology of "learning and serving is superior" and "all things are inferior, only reading is high". So in the eyes of parents, the word "application" is synonymous with "doing hard work." As an applied talent, this means that one's child will become a lower-class figure in society. Therefore, parents cannot accept their children becoming applied talents in their hearts. Influenced by social norms, the professional standard in the minds of young people is to become a scientist in the laboratory and a national cadre in the office, while the applied talents are workers working in factories. There is a misconception that research-oriented talents are social elites with superior status and status, while applied talents are inferior individuals engaged in "hard, dirty, and tiring" work, which leads to discriminatory attitudes towards them and unwillingness to become skilled talents [9]. Ideals are guides to action. Under the erroneous guidance of traditional thinking, parents lack understanding and support for the cultivation of applied talent, and students lack the willingness and motivation to become applied talent. Therefore, traditional ideological concepts have become the main reason for the shortage of students in applied undergraduate colleges, and how to cultivate students who have a resistance to applied knowledge has become a difficult problem faced by applied undergraduate colleges.

3.2. Incorrect Positioning of Application-Oriented Undergraduate Institutions in Higher Education

Regardless of the type of university, in the process of development, it is necessary to recognize the new situation of social development, comprehensively consider the needs of social development, and find the correct position in higher education. Applied undergraduate institutions should be aware of their mission to cultivate applied talent in the country and set training goals for various types of talent. Under the guidance of training objectives, we established training plans for various talents and allocated the corresponding teaching resources. The training objectives, teaching system, and teaching resources of applied talents should reflect the characteristics of "application" [10]. An education system for applied talent should reflect the teaching characteristics of combining theory and practice. Teaching resources should build a teaching platform that can cultivate students' engineering practical abilities, provide policy guarantees, and provide technical support for cultivating applied talents. Through investigation and analysis, we found that many applied undergraduate institutions have incorrect positions in the higher education system. In the process of school construction and development, regardless of their own educational reality, they have put forward the leapfrog development goal of "striving for first-class universities." "Domestic first-class," "world-class," and "high-level" have become the goals of many applied undergraduate colleges. Due to the influence of traditional talent concepts such as "emphasizing academic knowledge over practical application" and "emphasizing theory over practice", the talent training goals and systems

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set by applied undergraduate colleges and universities run counter to those of "applied" universities, resulting in serious problems of insufficient applicability of the applied talents cultivated.

3.3. Insufficient Understanding of Applied Talents among All Sectors of Society

In the minds of most people, the standard for measuring talent lies in "which higher education institution they graduated from and what level of education they have." They are not aware that different universities have different positions in higher education, and that different types of talent only play different roles in social development. There is no hierarchy of status among talents. In higher education, the talents cultivated are divided into research-oriented, applied, and skilled. Among the three types of talents, applied talents belong to a "free" existence, resulting in many misunderstandings among society about applied talents. Some people mistake the term "university" for a research-oriented talent, while others mistake it for a skilled talent based on the term "application." In fact, the difference between research-oriented talents, application-oriented talents, and skilled talents is obvious, mainly manifested in the different training goals of talents. The training goal of research-oriented talent is to cultivate students' ability to engage in research and innovative work in various fields of society, with research-oriented universities as the main body of training. The training goal of applied talents is to cultivate students' ability to apply professional theoretical knowledge to solve practical engineering problems, and the main body of training is applied to undergraduate colleges and universities. The training goal of skilled talent is to cultivate students' ability to apply mastered vocational skills to solve technical problems in the vocational industry, and the main body of training is vocational and technical colleges [11]. But the problem is that it is difficult for all sectors of society to judge the attributes of a higher education institution from its name, and it is also impossible to judge what kind of abilities students have from their appearance. Therefore, when facing applied talent, it is difficult for various sectors of society to directly come up with effective discrimination standards, which leads to an insufficient understanding of applied talent.

4. The "Three Certificates" Education Model and Its Implementation Methods

The establishment of a teaching system in applied undergraduate colleges should be centered around the word "application," and the training goal for students is to cultivate applied talents with a solid theoretical foundation and rich engineering practical abilities [12]. Currently, the evaluation criteria for students' professional theoretical knowledge and practical engineering abilities are formulated by schools based on their own situations, resulting in a lack of unified testing standards for applied talents cultivated by different universities, making it difficult to evaluate the quality of talents from different universities. This has led to difficulties for employers in implementing the scientific talent management concept of "using good people and using the right people" when selecting talents. Therefore, society needs a unified evaluation standard to evaluate the engineering practice abilities of undergraduate students. To solve the contradiction between the quality of talent cultivation in applied universities and the demand for talent quality in society, the "three certificates' education model has also been applied.

4.1. "Three Certificates" Education Model

In higher education, certificates that measure the qualification of talents include graduation certificates, degree certificates, and vocational skills certificates. A graduation certificate is a type of educational certificate obtained by graduates, which indicates that the holder has systematically studied certain scientific and cultural knowledge in a certain level of school; A degree certificate means that the recipient's educational level and academic level meet the prescribed academic title requirements; A vocational skills certificate is a certificate that measures the level of vocational skills of skilled talents, reflecting their comprehensive abilities required for professional activities and career development. In the current higher education talent training system, the "dual certificate" teaching model is implemented, which requires graduates to hold "graduation certificate and degree certificate" in undergraduate schools, and "graduation certificate and skill certificate" in vocational

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colleges. Therefore, the "three certificates" education model is a new teaching model, which refers to the teaching mode where graduates from applied undergraduate colleges hold three certificates: graduation certificate, degree certificate, and skill certificate when leaving school. From the definitions of various certificates, it can be seen that the educational focus of graduation certificates and degree certificates is to cultivate students' research and innovation abilities or engineering practical abilities, while the educational focus of skill certificates is to cultivate the application ability of professional theoretical knowledge and engineering practical abilities mastered by students in engineering construction. If a student holds a graduation certificate, degree certificate, or skill certificate upon graduation, it indicates that they have become a composite talent with a high level of scientific and cultural knowledge, solid professional theoretical knowledge, and rich engineering practical abilities. The implementation of this new educational concept can help applied universities find their rightful place in higher education - to cultivate the applied talents needed by society and make the students fully aware of their professional attributes - applied talents with certain professional knowledge and practical abilities.

4.2. Implementation Methods of the "Three Certificates" Education Model

The cultivation of applied talent under the "Three Certificates' education model is a complex and systematic project. It is necessary to establish a scientific talent cultivation system and allocate corresponding teaching resources to cultivate students' professional theoretical knowledge and practical engineering abilities, while clarifying talent goals. From the definition of the "Three Certificates" education model, it can be seen that the training objectives of applied talents under the "Three Certificates" education model are more stringent than those under the "Two Certificates" education model, which determines that there are significant differences in the methods used in the cultivation of applied talents between the two. The cultivation of applied talents under the "three certificates" education model must be based on the following three conditions.

4.2.1. Establish a Talent Training System of "Integration and Interoperability"

Applied talent must have solid professional theoretical knowledge and practical engineering abilities. Therefore, the focus of an applied talent training system is to cultivate students' ability to apply professional theoretical knowledge to engineering practice. Applied ordinary colleges are the cradle for cultivating applied talents, undertaking the dual tasks of imparting professional theoretical knowledge, and cultivating practical engineering abilities. In the process of talent cultivation, it is necessary to scientifically set teaching content and develop reasonable teaching plans based on the training objectives of talents and organize and implement a targeted and planned training process for applied talents.

The traditional teaching system for applied talent includes two parts: professional theoretical knowledge and engineering practice teaching, of which professional theoretical knowledge is the foundation of engineering practice. The cultivation of applied talents under the "Three Certificates" education model is a complex and systematic project, and its talent teaching system is based on the teaching system of applied talents, while adding deeper teaching content for vocational skills training. Therefore, it is necessary to integrate knowledge related to vocational skills into the traditional teaching system and integrate professional theoretical knowledge, engineering practice abilities, and vocational skills through a "blended and interconnected" teaching method.

4.2.2. Establishing a "Three Teachers" Teaching Team

Talents cultivated in applied undergraduate colleges should not only have solid theoretical knowledge, but also rich engineering practical abilities. From the cultivation goal of applied talent, we find that the achievement of this goal requires two types of teaching staff: knowledgeable theoretical level and rich practical ability. Teachers impart basic and professional theoretical knowledge to students, laying the foundation for their engineering practice. Engineering practice teachers cultivate the ability to apply professional theoretical knowledge learned by students in

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engineering practice. Therefore, the cultivation of traditional applied talents requires the establishment of a "dual teacher" teaching team consisting of "lecturers and engineers."

The cultivation of vocational skills talents under the "three certificates" education model requires a "three teacher" teaching team composed of "lecturers, engineers, and technicians" to elevate the engineering practice ability of applied talents to the level of skill operation, enabling students to enhance their engineering analysis and problem-solving abilities from a perceptual perspective. However, with the transformation from applied universities to research-oriented universities, research-oriented teachers with high academic qualifications have become mainstream teaching staff, and engineers and technicians with rich engineering practical abilities have encountered an awkward situation of being difficult to find in universities. In order to enhance students' engineering practical ability and practical hands-on ability, schools can effectively solve the problem of teacher training for applied talents under the current "three certificates" education model by sending out practical teaching personnel with training potential on campus and introducing technical personnel with rich engineering practical experience from outside the school.

4.2.3. Building a Practical Teaching Platform for "School Enterprise Cooperation"

The main body of practical teaching in universities consists of two parts: experimental and practical teaching. The equipment used in experimental teaching was experimental equipment, and the teaching venue was a laboratory [14]. Teaching facilities are characterized by low cost and small space. Training equipment is used for practical teaching, and teaching facilities have the characteristics of high cost and large space. The target audience of application-oriented undergraduate colleges is students from various engineering majors, and there are significant differences in practical teaching among different majors, which brings the problem of a large number and variety of teaching facilities to schools. A solution to this problem requires schools to provide spacious training venues and huge financial investments. For most applied universities, these dreams cannot be realized.

After a long period of construction and development, most application-oriented undergraduate institutions have sufficient and comprehensive experimental and training equipment that can meet the teaching requirements of traditional practical courses in the school. The cultivation of practical abilities of talents under the "Three Certificates" teaching mode requires not only experimental equipment and training equipment, but more importantly, authentic processing equipment and working environment. This is another challenge that schools currently face in cultivating skilled talent. Currently, most application-oriented undergraduate institutions have begun to attempt to use the "school enterprise cooperation" model to solve the above-mentioned problems. Enterprises have a complete range of manufacturing equipment and a real product production environment that can provide comprehensive practical teaching resources for the cultivation of skilled talent. Universities have superior research equipment and knowledgeable researchers, which can provide excellent research resources for the development of new products for enterprises. Universities can also provide enterprises with quasi-engineering and technical personnel with practical engineering experience, solving the current shortage of applied talents faced by most enterprises. Therefore, utilizing the existing experimental equipment of the school to build an experimental teaching platform for students, and providing students with a real engineering practice teaching environment through cooperation with enterprises, can build a comprehensive practical teaching platform for the cultivation of applied talents under the "three certificates" teaching mode.

5. The Significance of Promoting the "Three Certificates" Education Model in Applied Undergraduate Colleges and Universities

Through the above introduction of the "Three Certificates" education model, it can be seen that promoting the "Three Certificates" education model in applied undergraduate colleges is of great significance in guiding the construction of applied undergraduate colleges, promoting the healthy development of the education industry, and catering to the needs of social development.

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5.1. Clarify Talent Training Objectives and Provide Direction for the Construction of Applied Undergraduate Colleges and Universities

The training goal of applied talent is to cultivate quasi-engineering and technical personnel with solid professional theoretical knowledge and rich engineering practical abilities. Achieving this goal must be based on a scientific teaching system and high-quality teaching resources. This also specifies the direction for the construction of application-oriented universities: to develop a teaching system that can cultivate students' professional theoretical knowledge and practical engineering ability, build a teaching team that can engage in professional theoretical knowledge and practical engineering ability teaching, and build a practical teaching platform that can be used for various practical engineering projects.

The ultimate goal of talent cultivation under the "Three Certificates" teaching mode is for students to have solid professional theoretical knowledge, rich engineering practical abilities, and proficient professional operation skills. The cultivation of these abilities must be based on a gradual teaching system of "professional theoretical knowledge → professional practical ability → vocational skills training", which also clarifies the direction for the development of the teaching system in applied undergraduate colleges. The transmission of professional theoretical knowledge requires high-level instructors; the cultivation of practical engineering experience requires experienced engineers; and the transmission of vocational skills requires highly skilled technicians. This also clarifies the direction for the construction of teaching staff in applied universities: the cultivation of engineering practical ability requires corresponding experimental instruments, and the cultivation of engineering practical ability requires corresponding practical training platforms; the cultivation of vocational skills requires genuine processing equipment and a production environment, which also points out the direction for the construction of practical teaching platforms in applied universities. Therefore, the successful implementation of the "Three Certificates" teaching model has provided a clear direction for the construction of applied undergraduate colleges.

5.2. Optimize the National Education System and Promote the Healthy and Rapid Development of the Education Industry

Many countries have education systems that focus mainly on applied universities, combining research-oriented universities with applied universities. Research-oriented universities bear the dual task of cultivating high-quality and outstanding professional and technical talents urgently needed for national economic and social development, as well as high-level and outstanding talents to promote social and economic development. Applied universities are a new type of undergraduate education that have emerged based on the characteristics of universities in various countries, driven by the modernization of economic construction and the popularization of higher education [13]. From a definition perspective, there are significant differences between the two in terms of talent cultivation goals, and the education system should also develop methods and standards to distinguish between them.

Universities in various countries generally adopt the "dual certificate" education model, which means that university students can obtain a "graduation certificate" and a "degree certificate" upon graduation after systematically studying and mastering relevant theoretical knowledge and professional skills during their university years. It is difficult to distinguish the type of talent and their level of knowledge from the certificate, which creates difficulties in their independent career selection, employer selection, and employment. Under the "three certificates" teaching mode, it is explicitly required that students obtain both their graduation certificate and degree certificate, as well as the corresponding "skill certificate" upon graduation. Graduation and degree certificates explain to society the educational level and types of professional knowledge possessed by talents, while skill certificates explain to society the talent attributes and skill levels mastered by applied talents. Therefore, the "three certificates" education model can clearly distinguish the types of talents cultivated by universities, which helps universities accurately determine their position in the national education system and effectively optimize country's education system.

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5.3. Cultivate Composite Talents for the Sustainable Development of the Manufacturing Industry According to the Needs of Social Development

Composite talents are multifunctional talents characterized by their versatility and ability to excel in many fields. Composite talent should possess multiple abilities, such as knowledge, ability, and thinking. In a market economy, the types of products and production methods produced by the manufacturing industry change randomly. From the perspective of production efficiency and economic benefits, enterprises need "versatile" personnel who can perform different positions in production. With the increasing aging of the population, the human resources provided by society for the manufacturing industry are declining, which creates a contradiction between the sustainable development of the manufacturing industry and the increasing degree of social aging. Therefore, applied universities need to provide composite talents capable of different roles in the sustainable development of the manufacturing industry.

Under the "three certificates" teaching model, students trained in applied undergraduate colleges hold graduation certificates, degree certificates, and skill certificates when they leave, which means they have solid professional theoretical knowledge, rich engineering practice experience, and proficient vocational skills. In enterprise production, one can be competent in various areas, such as product design, production management, and product processing. When adjusting human resources according to production needs, one can become an all-around talent in the enterprise, serving as the "upper hall and lower kitchen". To solve the problem of personnel allocation in the production process for enterprises while avoiding the problem of low production efficiency caused by training new employees and the decline in economic benefits caused by excessive human resources. The root cause of the contradiction between sustainable development in the manufacturing industry and population aging lies in the shortage of human resources in the manufacturing industry, also known as the "labor shortage" problem. Composite talents trained through the "three certificates" education model have the advantages of "one person, multiple abilities" and can play the role of "one person, multiple positions" in the manufacturing industry. They can engage in different jobs at different times and on different occasions according to their needs and effectively resolve the contradiction between population aging and sustainable development in the manufacturing industry by exploring the "potential" of talents.

6. Conclusion

Applied undergraduate colleges should take it as their responsibility to cultivate applied talent for the country and, according to the needs of national economic development, cultivate various types of applied talent with certain engineering practices and innovation abilities for society. However, under the guidance of erroneous educational trends, most applied undergraduate colleges in China have deviated from their original intentions and shifted their talent cultivation goals towards the direction of research-oriented talent cultivation, resulting in a unique phenomenon of "a cluster of research-oriented talents and a shortage of applied talents" in the current manufacturing industry, which has brought unprecedented resistance to the development of the manufacturing industry. The trial and promotion of the "Three Certificates" education model will help application-oriented undergraduate colleges establish a talent cultivation and teaching system that integrates professional theoretical knowledge and engineering practical abilities, establish a "Three Teacher" teaching team composed of "lecturers, engineers, and technicians," and build an engineering practical teaching platform that combines course experiments, engineering training, and production internships, promoting application-oriented undergraduate colleges to return to the correct development track. The applied talents cultivated become composite talents in the manufacturing industry because they hold graduation, degree, and vocational skills certificates, which can effectively solve the current human resource management problems faced by enterprises and the sustainable development problems of the manufacturing industry caused by the aging population. Therefore, the implementation of the "three certificates' education model is of great significance for the development of applied talent, the manufacturing industry, and society.

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