

Research on Innovative Application of TRIZ Theory in Vocational Education

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Abstract:

Engineering education model based on TRIZ, including an entrepreneurship practice platform for college students, is discussed in this paper. On the platform, the innovation and entrepreneurship project are implemented, entrepreneurship team is formed, and Heilongjiang ZhuoAo Robot Technology Co.,Ltd is established. The project implementation results showed that vocational college student's professional skill is improved through TRIZ education, thus it cultivates the student's engineering practice ability, innovation ability and Entrepreneurial ability.

Key words: Engineering education model, TRIZ, professional skill

Innovation is the soul of national progress. With the advent of knowledge economy, people have deeply realized that knowledge plays an important role in economic development. Talents who are good at innovating knowledge and technology are playing an increasingly important role in national economic construction. To this end, the world has set off a wave of deepening educational reform and training innovative talents. Especially in China, "innovative talent" has become a phrase used frequently in Chinese characters. Creating a platform suitable for training innovative talents has also been put on the agenda. At present, innovation training abroad has been relatively complete. American universities adopt the concept of student-oriented education to cultivate a large number of innovative talents; French universities adhere to the training mode of "multi-disciplinary" and "multi-angle", combining theory with practice; German universities and enterprises cooperate to carry out "two-way mode" to cultivate innovative talents; Japanese universities attach importance to the cultivation of individual innovation ability, innovative thinking and creative expression. In China, the educational administration departments at all levels pay more and more attention to the cultivation of innovative talents, organize competitions in various disciplines and social practice activities, and establish an incentive mechanism for innovative talents. This is the methodology to solve the problem of invention. It has been widely used in many enterprises such as Boeing, GM, Chrysler and Motorola in the United States to improve

the technical designers. Work efficiency and develop high quality products. TRIZ was invented to conceive efficient ideas for rational problem solving. But unlike other innovative methods, TRIZ has its distinct characteristics, that is, to maximize human intelligence.

TRIZ theory pays attention to the training of innovative thinking, which is beneficial for students to develop their thinking and improve their scientific and technological quality. This paper expounds the application of TRIZ theory to the training of innovative talents in Higher Vocational colleges: the construction of five-in-one creating space with TRIZ as the core, the training of innovative teachers in TRIZ education, the construction of innovative curriculum system based on TRIZ, and the competition activities under the guidance of TRIZ theory; and affirms the positive role of TRIZ theory in the training of innovative talents in Higher Vocational Colleges through summary.

TRIZ theory is a theoretical system summarized and formed from 2 million patents under the leadership of Azishulle, which has been given the title of "theory of technological system evolution". It is an innovative method with strong operability. In recent years, TRIZ theory, known as the "Golden Key to Invention", has entered the world. Under the new situation of advocating "mass innovation and entrepreneurship by all", the training of innovative talents based on TRIZ theory has been carried out step by step. TRIZ theory holds that 70% of inventions belong to level 1-2 inventions. As long as it involves knowledge within the specialty and industry, such inventions are very suitable for the characteristics of Higher Vocational talents: Practical and practical. Our Institute has made some attempts in applying TRIZ to carry out innovative education and cultivate innovative talents, and has made some achievements. It is also easy to popularize in Higher Vocational Colleges of similar scale.

1. Constructing a Five-in-One Creative Space for TRIZ Theory Innovation and Practice

Through the structural model of TRIZ theory, we can find that the theoretical system is not simple. Professionals are required to interpret the understanding and application of various tools, algorithms, terminology. The promotion of this theory will inevitably require a team to operate. Physically speaking, we also need a certain space for implementation. Based on this, we construct a five-ring public creation space and innovate the TRIZ theory. The dissemination and application of the theory is at the core level, and the professional teachers of Innovation and Entrepreneurship College are responsible for the application and promotion.

Five-in-one multi-creation space runs through all the organizational objects and operational teams of innovative talents training, taking multi-creation space as the core, radiating outward: first, multi-creation space (innovative workshop), focusing on the popularization of TRIZ theory and other three-creation knowledge, promoting the formation of three-creation consciousness; second, guiding students' innovation and entrepreneurship through innovative entrepreneurship teachers inside and outside school; third, through innovative entrepreneurship teachers' guidance; Teachers and equipment of the professional training room in the school are responsible for assisting students to provide professional guidance programs for solving innovation problems and providing technical guidance for students' innovation and entrepreneurship; the fourth place is the school-enterprise cooperation units and science and technology parks, which are responsible for guiding students to carry out market demonstration of innovative products and give them market-oriented help and guidance; the fifth place is the school-enterprise cooperation units and science and technology parks. Outside ventures, investment enterprises, etc. are responsible for helping students form entrepreneurship projects for innovative products, and providing resources docking and financial assistance.

By the end of 2016, with the care and support of Heilongjiang Agricultural Reclamation Vocational College of Science and Technology, Zhuo-ao Robot Technology Co., Ltd., the first university student entrepreneurship company in Binxibin County, has successfully incubated a number of start-up companies through the five-in-one multi-creation space. It is a technology company focusing on artificial intelligence technology, intelligent robots and juvenile robot education. The core team comes from all of them. Heilongjiang Vocational College of Agricultural Reclamation Science and Technology, the company's in-depth learning algorithm, machine vision algorithm, computing platform application research provides technical and platform support for a number of important events, provides training for innovative laboratories in many schools, is committed to the development of the most professional artificial intelligence, robotic teaching platform, for national provincial and ministerial level competition equipment and programs.

Heilongjiang Zhuo'ao Robot Technology Co., Ltd. is the first university student start-up company in Binxibin County, and the first robot technology company in Binxibin County. The company officially opened in May 2017. In July, it was listed on the New Fourth Board of Heilongjiang Greenbelt Equity Financial Asset Trading Center by Greenbelt Group, and established joint research centers with well-known domestic and international high-level universities. Named and successfully held the 2017 and 2018 Heilongjiang Education Department Vocational College Students' Skills Competition to promote the development of AI in Higher Vocational colleges; to provide product technical support and services for Heilongjiang, Jilin, Liaoning, Sichuan, Henan, Jiangsu, Beijing and other places. The total value of equipment

donated to Jiamusi University and Harbin Institute of Petroleum is 150,000 yuan. In 2018, one laboratory was built for the college, and 250,000 yuan was donated to teaching instruments and equipment. The company is currently an expert unit of national robot competition (education) equipment. The company is also the only deputy referee unit of the Chinese Robot and AI Competition and the League Central University AI Innovation Competition. It has become the youngest supplier of robotic equipment for many well-known robotic competitions in China.

2. Creating the professional and concurrent teaching staff of TRIZ innovative education for the training of innovative talents. Improve the construction of teachers through internal training and external introduction: 1. Invite outside experts to form advisory groups to guide the construction and cultivation of innovative teachers; 2. Establish innovative entrepreneurship teaching and research office to popularize innovative entrepreneurship knowledge throughout the school; 3. Organize teachers to participate in the training of innovative methods teachers in Heilongjiang Province; 4. Take TRIZ online courses as the school's public elective courses; 5. Participate in the training of innovative entrepreneurship teachers; Internet + innovation and entrepreneurship competition teacher training and other training, rich in innovative thinking application of teachers.

3. Constructing innovative curriculum system based on TRIZ theory, innovative talent education can only guarantee normalization and standardization, and can carry out more effective teaching and evaluation. The construction of curriculum insists on the combination of inviting in and going out and combines professional stimulation of students' innovative consciousness to cultivate students' innovative ability. The innovative curriculum system based on TRIZ theory involves TRIZ education. The introduction level and promotion level of TRIZ are different, and the course mode includes compulsory courses, elective courses and cross-education with other courses. The optional courses such as TRIZ Innovation Principle and TRIZ Application Practice are developed. The cases of TRIZ theory application are emphasized and excavated in the professional courses, requiring each course to implement 1-2 hours of innovation guidance, which enriches innovation. The curriculum system of personnel training. Based on TRIZ theory, courses such as "Intelligent Robot Technology", "Introduction to Single Chip Microcomputer", "Production Operation and Management", "Playing 3D Printing Technology", "Application of Multi-Professional TRIZ Theory" are constructed.

4. Making use of TRIZ theory to vigorously carry out innovations and make a

prominent appearance in various competitions

Competition can effectively mobilize the enthusiasm of teachers and students. The College formulates and implements the "Management and Reward Measures for Innovative Entrepreneurship of College Students", guides teachers and students to participate in various competitions selectively, and clarifies the management methods and processes of participating in the competition in the "Five in One" space. TRIZ, as the source of creative stimulation and the theory of technical direction guidance, plays an important role in the creative competition.

China's robotics and AI innovation competition, University AI innovation competition, China Internet + innovation and entrepreneurship competition and other activities will carry out thematic reinforcement and demonstration of TRIZ theory lectures before giving students confidence and open up their minds. In 2018 alone, TIRZ won 120 awards in various competitions, and its leading role can not be underestimated.

5. Problems and Reflections

In the final analysis, the growth of innovative talents is the result of the comprehensive effect of school, society, family, cultural environment and other factors. School education is only one of the important links. According to the 80/20 rule, the precondition for the emergence of top figures is that their cardinal numbers are large enough. Therefore, the essence of school education is to create such a base, rather than innovative talents in a full sense. The innovative education model based on TRIZ theory is a model suitable for the cultivation of innovative talents in Higher Vocational colleges. It creates a cultural environment of innovative education where innovation is ubiquitous. It implements the "three-way" project of innovative education into talent training program, curriculum system and classroom, and puts forward the concept of innovative "everywhere and everywhere". It is a comprehensive, systematic and effective innovative education method for all students, but it is not mature enough and needs to be further improved and perfected. Due to the restriction of traditional concepts, TRIZ innovation method education has been carried out in a few vocational schools in China. How to use TRIZ theory to solve the problem of "what to teach" and "how to teach" in innovation education is also a key problem to be considered and solved.

However, the innovative education mode based on TRIZ theory still has important reference and application value for promoting the innovative education of college students in Higher Vocational colleges.

6. Conclusion

In affirming the positive role of TRIZ innovation theory in stimulating creativity and guiding interest, the College vigorously promotes TRIZ education and creates a five-in-one public space for TRIZ innovation, which better promotes the development of innovative talent training and has achieved gratifying results. Various talents of the College have won several first and second prizes in different creative innovation and entrepreneurship competitions. The effective development of innovative ideas has promoted the college's entrepreneurship education work, and the college has been awarded the Jiangsu Provincial Pioneering Demonstration College. In 2018, based on TRIZ innovation theory, nearly ten companies successfully registered in the college from creativity to entrepreneurship. The market capitalization of some of the graduated students' companies has reached million-scale in four years, which greatly affirms and encourages the innovation and entrepreneurship education work of the college, and also highlights the charm of TRIZ theory in innovation and creativity education.

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