Exploration and Practice of "1 + 1 + 1 + X" Integration Mode in Modern Robot Industry College

Jian Fang[1, a *] and Yue Wu[1, b]

[1]Jilin Engineering Normal university, Changchun, Jilin, China

[2]Jilin Engineering Normal university, Changchun, Jilin, China

[a]757314739@qq.com, [b]28841898@qq.com

[*]corresponding author

Keywords: Cultivating Path; Cooperative Education; Multivariate Model; Fusion of Production and Education

Abstract: Design the implementation plan for the construction of modern robot industry college, break the professional barriers, explore the "1 + 1 + 1 + X" co-construction and co-management organizational structure and co-governance model, and support a complete operating system and organizational carrier. This paper proposes the optimization of multi-party collaborative education organization model and the realization of curriculum system design and teaching content optimization through the establishment of interdisciplinary industrial college. The teaching quality monitoring system should be set up, and the pillar industries of jilin province should be closely connected through the evaluation of the quality of talent cultivation, the fit between specialty and market demand, etc., so as to build a multi-talent cultivation model of "integration of science and education, integration of industry and education, integration of truth and truth" featuring interdisciplinary integration, multi-college construction and multi-platform sharing.

1. Introduction

The establishment of the institute of modern robot industry marks the concrete implementation of the policy of promoting the in-depth integration of schools and enterprises, accelerating the development of new engineering and exploring the new mode of engineering education oriented by promoting innovation and industrial development, which is proposed in the opinions on accelerating the construction of high-level undergraduate education and comprehensively improving the talent cultivation ability. It marks a new engineering field in our school talent training into many area, multi-level, many cross scale cultivation stage, promote the supply side of talent fostering and the industrial structure of demand side factors comprehensive integration, building personnel training, professional construction, curriculum development, teacher training, corporate training, scientific research, achievements, and other functions in one of the leading high standard education service platform, improve the industrialization of achievement of robot industry innovation and ability. Centering on the key technologies and core needs of the industry chain and innovation chain gathered in the region, the sustainable development model with a platform built by the government and in-depth participation of multiple parties will be explored in depth. Develop curriculum implementation model, created based on the deep integration of production and education applied undergraduate talents training pattern diversity research determine the professional orientation, to develop the talent training scheme, make joint curriculum quality standard, teaching of participation, mutual monitoring quality of personnel training, to ensure the project of cultivating applied talents be implemented. It aims to cultivate more high-quality and highly skilled applied talents for enterprises, and at the same time to provide more space for multi-party students to practice, staff training and multilateral scientific research [1].

2. "1+1+1+X" integrated talent cultivation mode

According to the idea of “market demand -- major orientation -- training objectives -- graduation requirements -- competency standards -- curriculum system -- teaching implementation -- evaluation feedback -- continuous improvement”, modern robot industry college has constructed an integrated talent training system of “1 + 1 + 1 + X”. Put forward the three-dimensional curriculum system of “the first class, the second class and students' self-growth”; The establishment of the “school-school-professional-teacher” four-level teaching quality monitoring system ensures that the talent training meets the market demand through the quality evaluation of talent training and the evaluation of the fit between specialty and market demand. Through the deep integration of production and education of multiple models, to achieve multi - inclusive education. Each major accurately connected with the corresponding industrial chain, and established the mechanism of in-depth integration of industry and education: jointly study and determine the professional positioning; Jointly formulate talent training programs; Jointly develop curriculum quality standards; To participate in the process of teaching implementation; Jointly monitor the quality of talent training. At the same time, it has formed the multi-mode of integration of multi-schools and deep integration of production and education: the introduction mode - the co-construction mode - the external construction mode [2]. This is shown in figure 1.

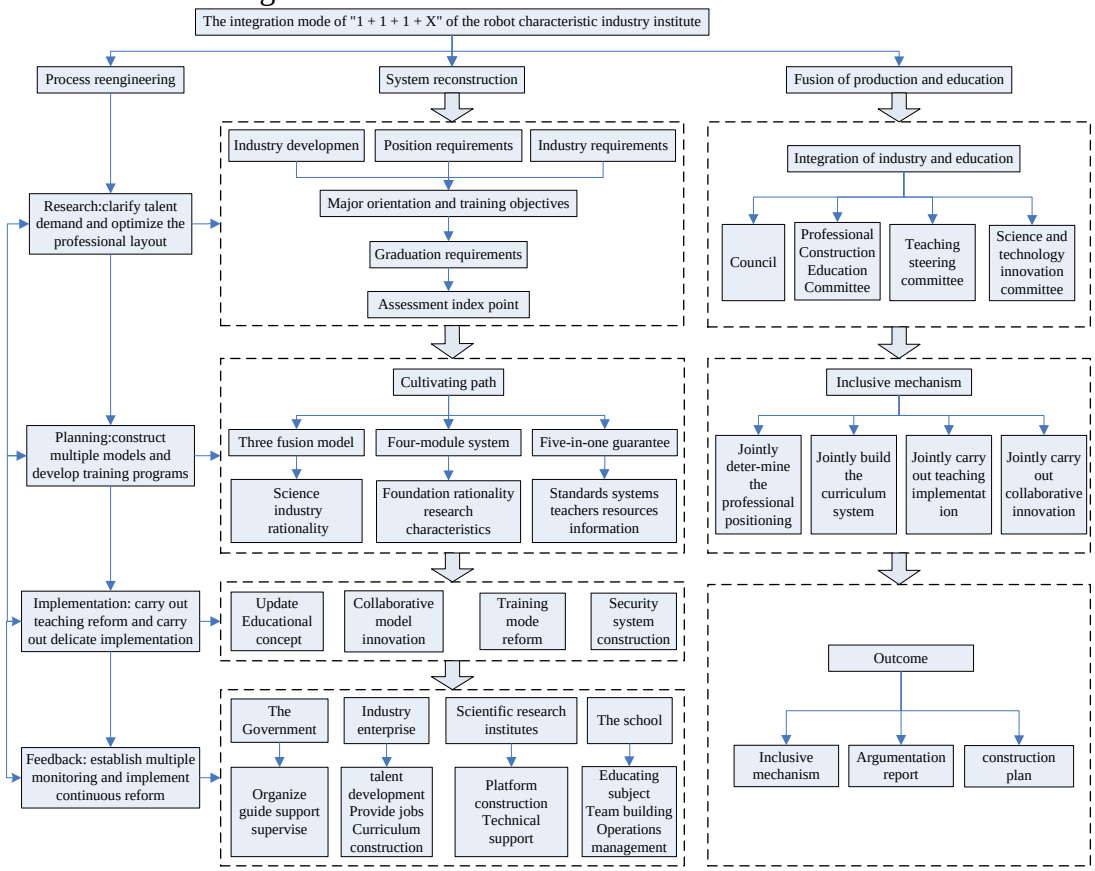

Figure 1. The integration mode of “1 + 1 + 1 + X” of the robot characteristic industry institute

3. Cultivating path

3.1. Establish the logical path of industrial college construction

Based on the opinions of the ministry of education on accelerating the construction of high-level undergraduate education and comprehensively improving the cultivation ability of talents and other policies related to new engineering, the construction of industrial college was logically started. The construction office of industrial college was established, and the implementation opinions on the construction of industrial college was formulated. Taking the industrial demand as the starting point, the industry’s demand for talents quality and the industry’s demand for technological innovation are clarified, and the requirements of diversified and innovative outstanding engineering talents for the

upgrading of traditional industries and emerging industries are determined to be cultivated to meet. Optimization communion education organization model, by establishing the interdisciplinary integration of industry college, curriculum design, teaching content optimization and industrial technology innovation, set up the “integration, innovative, full cycle “education idea, break the barrier of the disciplines, across the barriers, the implementation of various fusion, really set up industry institute “through body” of the construction of the “cross body” and “community”, made solid progress in the construction industry institute[3].

3.2. Highlight the adaptability, guidance, intersection, optimize the layout of disciplines

The focus of the construction of disciplines and specialties has shifted from comprehensive to characteristic, and the existing layout of disciplines and specialties has been optimized and adjusted to meet the needs of the regional economic development of jilin province. We have promoted the upgrading of traditional engineering majors, and upgraded three traditional majors, including mechanical and electronic engineering, to cultivate students’ abilities in intelligent design, intelligent construction and intelligent operation. Grasp the “new requirements of engineering”, in order to break the discipline barriers, promote integration, and meet the development needs of local pillar industries and strategic emerging industries in jilin province.

3.3. A multi-talent cultivation model integrating “science and education”, “production and education” and “truth and practice” is constructed

In the construction and reform of industrial college, it pays attention to “integration of science and education, integration of industry and education, integration of science and practice”, and emphasizes the establishment of a multi-party integration mechanism of information integration, resource sharing and win-win cooperation, so as to form an ecological environment of joint innovation and systematic education between industries and schools [4]. Relying on the advantage of professional disciplines, breakthrough the traditional education mode, actively and scientific research institutes, society, and leading enterprises to carry out the cooperation in running schools, created many area, multi-level, many cross scale depth integration of production and education personnel training mode, to achieve professional chain and industrial chain, course content and professional standards, teaching process and production process.

3.4. A four-module curriculum system of “foundation + reality + research + characteristics” has been formed

Comply with “integration, innovative, full cycle” education philosophy, in the construction of curriculum, strengthening the construction of professional foundation course, the course content and teaching method improvement, could give students lay a solid professional foundation, charity, pay attention to the combination of theory and practice of building professional foundation thick, interdisciplinary fusion, the overall optimization of basic course module. To strengthen the construction of truth-oriented curriculum, with the guidance of the whole process of engineering project design, product development and production, and systematic operation and operation, so that students can build relevant subject knowledge and develop comprehensive practical ability of engineering in the process of the completion of specific practical teaching links, so as to embody doing middle school and doing while learning. Strengthen the construction of research courses, compile excellent scientific research achievements of teachers into textbooks or apply them to courses, promote the mutual transformation and improvement of scientific research and teaching, and cultivate students’ research ability and spirit of cooperation[5].In the construction of characteristic courses, innovation and entrepreneurship courses are offered based on various competitions at all levels to improve students’ awareness of innovation, collaboration and compound ability, thus forming a ladder module course system of “basic + comprehensive + research + characteristic”.

3.5. A five-in-one guarantee system of “standards, systems, teachers, resources and information” has been established

According to the characteristics of the industrial college, the quality standard of talent training is set. At the professional level, the achievement degree of talent training quality is measured as a whole, which is transformed from the talent training goal of the industrial college. At the level of curriculum, the rationality of the curriculum system is measured by the quality standards of each curriculum module, which are transformed according to the curriculum standards of knowledge and ability. In terms of system and mechanism construction, we should establish training organizations of industrial colleges, including leading groups, construction offices, teaching supervision groups, relevant departments, cooperative enterprises, research institutes, etc., with clear responsibilities and responsibilities of relevant departments, so as to promote the cultivation of "outstanding" talents in industrial colleges. In terms of the construction of the teaching staff, the method of combining internal cultivation, external introduction and part-time jobs has been adopted to build a "double-division multi-functional" teaching team with rich industrial practice experience, multidisciplinary integration ability, ability to solve complex engineering problems, and ability to deal with future problems. Establish operation effective information platform, according to the school, society, industry, enterprise, unit of choose and employ persons data requirements, strengthen communication and cooperation, collecting industry college students in the process of professional personnel training education teaching activities of information flow, to scientific classification and processing of information, timely feedback to the school relevant departments and personnel demand unit, ensure smooth information, comprehensive and open[6].

4. The main problem solved

4.1. To solve the problem that the cultivation of undergraduate engineering talents deviates from engineering practice and industrial demand

Robot engineering is of great significance to China's new manufacturing advantages, industrial transformation and upgrading, and to accelerate the construction of a manufacturing power. These factors determine that the construction of robot engineering is one of the key directions of the construction of "new engineering". Our school set up this robot engineering major in 2016, which is the first one among the five universities in jilin province. The robot engineering major covers a variety of disciplines, and its talent cultivation method cannot be a simple mix of control engineering, computer engineering, mechanical engineering and other disciplines. At present, robot engineering talents lack comprehensive practical ability, their core ability is not clear, they deviate from the orientation of industrial demand, and their knowledge and skills are not completely consistent with social development and industrial demand, which is far from meeting the needs of the robot application market. Institute of modern industrial robot to pinpoint training target, make full use of regional industry advantage, give play to the role of enterprise education, such as the main body, combining the industrial robot needs, for the current needs and future industrial development in robot layout of personnel training, to explore the formation of modern robot industry institute building mode, cultivating modern robot industry talents with innovative integration ability[7].

4.2. To solve the problem lack of effective carrier support for organizational barriers in multi-party cooperation

At present, there are many problems in the integrated development of local universities, especially in the cooperation channels, cooperation modes, cooperation contents and cooperation mechanisms. It is difficult for enterprises to integrate the external high-quality educational resources with the resources of colleges and universities. By co-building industrial colleges with industries and enterprises, resources can be relatively gathered, specialties can be matched with specific objects in the service industry, and closer production-learning interaction can be achieved. It is conducive to the realization of the demands of both sides and the solution of the long-term mechanism of multi-party cooperation [8]. Centering on the key technologies and core needs of the industry chain and innovation chain gathered in the region, the sustainable development model with a platform built by the government and in-depth participation of multiple parties will be explored in depth.

4.3. Solve the sustainability problem of co-governance, sharing and win-win among multi-agent collaboration

Actively adapt to the needs of jilin province's intelligent manufacturing equipment industry and vocational education, establish strategic cooperative relations with enterprises, run schools for local industries and enterprises, and link transformation resources with local innovation resources [9]. Adopt the method of theory to guide practice, established the “communion plural interaction” vocational education idea, the robot industry college will take 1 + 1 + 1 + X school-running mode, that is our school, Chinese Academy of Sciences, artificial intelligence institute of jilin province, and the mind group, chongqing’s flat, Yi Qi science and technology, and other high quality enterprise integration of resources, to enhance universities, research institutes, society and high quality enterprise synergy innovation ability, give full play to the academics engine innovation resources and innovation, promote enterprise real production task type, project training mode[10].To establish the talent training process, the charter of the council, the operation guarantee mechanism, the talent training program, the curriculum system, the series of teaching materials and the implementation cases, etc.

Conclusion

At present, the reform has completed the pilot and comprehensive promotion in the hospital, and has gone through two rounds of practice to realize the systematic optimization of key elements in the talent cultivation process of various specialties. The quality of students' employment has been continuously improved. The employment rate of graduates has been increasing steadily year by year, reaching 90.2%. More than 30 of them have entered the world’s top 500 enterprises, more than 100 have been admitted to the state grid, and more than 20 are engaged in vocational education. The number of students making innovations and starting businesses has increased significantly. Students have won more than 300 awards in various academic science and technology competitions, and more than 100 national innovation projects and jilin provincial innovation projects. Students published 6 papers and applied for 2 patents. The quality of talent training is significantly better, the students’ employment competitiveness is improved year by year, and the social reputation is improved day by day. Finally, an innovative and applied talent cultivation mode that can be implemented and popularized has been formed.

Acknowledgement

Educational science planning project of Jilin province〈Exploration and practice of engineering process systematization curriculum system under the new engineering background〉(Project lea der: Jian Fang, project number: GH180599).

References

[1].Chunhui Li. Research on the model of modern apprenticeship education based on industrial college[J]. Ability and Wisdom, 2020, (6): 24-26.

[2].Dan Zhang. To explore a new model of collaborative education of government, industry, education and research under industrial cluster -- a case study of IC industry college in Yangtze river delta region[J]. Education and teaching forum, 2020, (8): 266-267.

[3].Yinghui Yang,Yihan Yang. Research on the development of industrial colleges in higher vocational colleges under the background of integration of production and education [J]. Vocational Education Forum, 2018, (12): 114-118.

[4].Humai Liui, Xie He. Cultivation of Applied Talents Based on “Triple Integration”: Construction Path of New Industrial College [J]. Higher Engineering Education Research, 2019(1): 62-66.

[5].Ronghua Li,Jinghua Qiu. On the Construction of Industrial Colleges in Applied Undergraduate Colleges[J]. Education and career, 2019 (14) :36-42.

[6].Fang Jian,Shao Fang.Exploration and Practice of “Dual Integration”Mode of Collaborative Production and Education in the Context of Applied Transformation-The Case of Automotive Service Engineering[J].MCEI2017,2017:1-4.

[7].Jian Fang,Guohong Zhen,Fang Shao.Exploration and practice of the mode of “double integration” industry-university-research-application collaborative talent cultivation -- taking automobile service engineering major of Jilin Engineering Normal university as an example[J].Vocational and technical education,2018(02):35-38.

[8].Jian Fang.The exploration and practice of the cultivation mode of automobile service engineering talents under the background of application-oriented transformation[J]. Journal of Jilin Engineering Normal university,2017(12):96-98.

[9].Jian Fang.Research on the collaborative model of “school-enterprise-school” for the construction of double-teacher vocational education teachers[J]. Journal of Jilin Engineering Normal university,2013(10):27-29.

[10]. Fu Li,Shizhan Zhang.Innovation and practice of combining industry and education with school-enterprise “dual” education mechanism - taking engineering majors as an example[J].Modern marketing,2020(03):238-239.