

Research on the Training Model of Engineering Excellence

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Abstract: Excellent engineer education training plan (hereinafter referred to as the "excellent engineer") is the national Ministry of Education to carry out the important content of higher education long-term planning, to improve the engineering technology college student's employment ability, practice ability, cognitive ability, innovation ability has important guiding role, is an important part of college students' career education practice. "Mass entrepreneurship and innovation" (hereinafter referred to as "mass entrepreneurship and innovation") is an important document to cultivate the spirit and consciousness of innovation among the people. It is a key policy for cultivating the innovation gene of the people and realizing the transition from "Made in China" to "Created in China". From the perspective of "mass entrepreneurship and innovation", this paper discusses the ways of "electronic information" professional and "excellent engineers". Taking the School of Science and Technology of North China Electric Power University as an example, it proposes a set of complete and operable talent training mode.

Keywords: Mass entrepreneurship and innovation, Excellent engineer, Talent training, Educational practice

INTRODUCTION

The number of college graduates nationwide is expected to reach 10.76 million in 2022, Up 1.67 million from 9.09 million in 2021, The number of college graduates exceeded 10 million for the first time, at the same time, Due to COVID-19, the conflict between Russia and Ukraine, anti-globalization and abuse of economic and technological means, Thus to the combination of adverse factors such as sluggish global economic growth, The employment situation of college graduates is even more severe, According to the 2021 College Graduates Employment Report released by 58 Tongcheng, The graduate employment rate in 2021 is only 34%, Business bosses in most provinces across the country are struggling to endure a shortage of skilled workers, Take Liaoning Province as an example, According to the "Skills Liaoning in Action": in 2022, Only at 24%, A much lower share of the total employed population, Very lack of senior technical personnel. This kind of "college students, severe employment" and "serious shortage of skilled workers" form a huge contrast, which has a huge impact on China's education system.

"Double gen" first in 2014 by prime minister li keqiang in davos on the BBS, the purpose is through the "double gen" fully stimulate the wisdom of hundreds of millions of people and creativity, eliminate the shackles of various policies, environment and shackles, make the "double gen" a new trend of The Times, in order to realize the national strong, people's rich, economic and social development to provide strong new kinetic energy. After several years of development, the concept of "mass entrepreneurship and innovation" has been deeply rooted in the people, and was elected as one of the top ten economic buzzwords in 2018.

Electronic information professional generally has high technology content, strong professional

characteristics, is the important driving force of national economic development, on the basis of chip electronic information industry by western sanctions represented by the United States, or block, American wave, overweight chip sanctions stick, successively sanctions the zte, Huawei, big China's relevant high-tech enterprises, represented by university of electronic science and technology, defense science and technology university information universities and related individuals, and related professional students, such as AI, SOC, etc.

Under all these circumstances, our university educators have to think about how we can cultivate a large number of electronic information "excellent engineers" who meet the needs of domestic "mass entrepreneurship and innovation" under such "unprecedented changes in a century" and "anti-globalization" international environment.

RESEARCH STATUS, BOTH AT HOME AND ABROAD

In China, the training of "excellent engineers" is mainly carried out from the perspective of professional characteristics and the perspective of training program. Fan Yan (2020) took the sustainable development of "mass entrepreneurship and innovation" education in colleges and universities as the starting point, studied and discussed the innovation of the education concept of "mass entrepreneurship and innovation", the innovation of education mode and the improvement of the quality assurance system, and explored the innovation path of "mass entrepreneurship and innovation" education in colleges and universities. Dong Wenzheng, Li Yanhong and Huangtao (2022) believe that with the rapid development of information technology in the world, All kinds of colleges and universities should also actively adapt to the changes of The Times, Against the backdrop of

the mass entrepreneurship and innovation policies, Adopt practical and feasible means to encourage college students to innovate and start, This directly affects the cultivation of innovative talents in China, On the basis of the analysis of the research status of innovation and entrepreneurship education in universities in China, On the one hand, summarizing the problems existing in the current higher education model in China, On the other hand, the higher education mode is preliminarily discussed from the perspectives of excellent engineer training plan mode, the construction of innovation and entrepreneurship curriculum system and the construction of "mass entrepreneurship and innovation" education teachers. Cheng Yong Sheng (2018) first summarizes the western countries for the implementation of the "outstanding talent plan", and in Germany as an example, analyzes the overall layout and implementation plan, and then analyzes the implementation of the "excellent engineer" talent training plan framework and ideas, to restrict the "excellent engineer" plan implementation obstacles and bottlenecks are discussed, put forward the level of "excellent engineer" training opinions and Suggestions. He also thinks: "excellent engineer" training should draw lessons from the successful experience of foreign "excellence plan", at the same time also must combine the national conditions of Chinese education and the school, the "excellent engineer" and "the" double gen "project," double " construction national major strategic deployment, further gather strength, from the integration of innovative talent cultivation.

Hui WANG, Chunxiao CHEN (2020) analyzes the five difficulties faced by China's private innovation in the new era, and summarizes the practical experience of Japan, France, the United States and other developed countries. In addition, also need to from the folk researchers and folk scientific and technology innovation activities to give national treatment, give priority to evaluation conditions and equal protection of folk science and technology

research achievements, etc., efforts to improve the folk innovation policy, solve the problem of folk innovation funds, promote folk innovation scientific and technological achievements, attaches great importance to the innovative personnel training, form independent innovation entrepreneurial talent resources. Yijing Chen (2011) proposed the cultivation mode with engineering ability and innovation ability as the main line in Research and Practice on Distinguished Engineer in Specialty of Measurement and Control Technology and Instrument, The cultivation of the innovation ability of "excellent engineer" is as equally important as the cultivation of professional ability.

RESEARCH FINDINGS

Talent training program for "excellent engineers" of electronic information based on the integrated perspective of "mass entrepreneurship and innovation"

The training program is the core document of the professional talent education, Which determines the quality of undergraduate training, In the process of the formulation, Fully analyzed the professional characteristics, And many times with the enterprise front-line staff, supervisors, students who have worked for 2-3 years after graduation, Understand their requirements and deficiencies in their learning process and content, Finally, the compulsory courses with the professional setting requirements of the Ministry of Education as the main body and the professional limited courses based on the requirements of "mass entrepreneurship and innovation" are formed, Cultivate students' basic knowledge and basic abilities through majors, compulsory courses, To improve students' innovation ability and work ability by limiting professional courses, Finally, the overall ability of the trained students will be improved.

Table 1 Catalogue of "Excellence, Engineer" (part)

	Introduction to electronic information major	1	16	14	2	1
	Innovation and entrepreneurship education	1	16	16		1
	Fundamentals of Circuit Analysis	3.5	56	56		2
	Basic experiments for circuit analysis	0.5	8		8	2
	Experiment A in A. C	1	16		16	3
Major basic courses	Simulated electronic technology foundation A	3	48	48		3
	Signals and Systems	3	48	48		3
	Basic experiment of digital electronic technology A	1	16		16	4

Electromagnetic fields and electromagnetic waves	2.5	40	40	4
digital signal processing	2.5	40	40	4
Digital electronic technology Foundation A	3	48	48	4
Communication electronic circuit	2.5	40	40	4
Principles and design of the Microprocessor system	2	32	32	5
Information theory basis	2	32	32	5
Principle of communication system	4	64	64	5

Table 2 Catalogue of "Excellence, Engineer" (part)

	Theoretical basis of communication network	2	32	32	5
Professional compulsory course	Data communication and computer networks	2	32	32	5
	Modern exchange technology	2	32	32	6
	Optical fiber communication principle	2.5	40	40	6
	mobile communication	2.5	40	40	6

Table 3 Catalogue of "Excellence, Engineer" in Electronic Information (part)

	DCS	2	32	28	4	6	
	Microwave engineering	2	32	32		6	
	wireless network technology	2	32	32		7	Professional deepening module
	satellite communication	2	32	32		7	
Elective 1	Internet of Things technology and application	2	32	24	8	5	New technology expansion module
	artificial intelligence technology	2	32	24	8	5	
	digital image processing	2	32	26	6	6	
	Matlab Foundation and application	2	32	16	16	3	
	Data structure and algorithm analysis	2	32	26	6	5	Computer technology module
	Visual C # Project development	2	32	28	4	6	
	Take professional courses in other majors across majors					2-8	
Elective 2	Elective courses in general education	At least 2 credits of elective public art courses; Other available course credit replacement in Group 1				2-8	Other elective courses

The teaching mode with students as the main part and teachers as the auxiliary part

First of all, the whole class of students to find out the bottom, and then classified, respectively divided into (1) postgraduate examination, examination, examination; (2) direct work, take the engineer this road.(3) Start their own business; these three types of students will have different emphasis in practical teaching. This paper discusses how to train students in categories (2) and (3). The classroom teaching of "Excellent Engineer" is completely student-oriented, and teachers play a supporting role. For example, the course "Data Communication and Computer Network" divides 32 hours into 6 topics, each with 4 hours, and the last 8 hours are used for the acceptance results. In acceptance results, no longer arrange the traditional closed book exam, but adopted by teachers and cooperative enterprises jointly organize acceptance team, let the student to the identity of "staff" to "department leaders" report, according to the thesis (design) defense form, first by the students in the platform, combined with PPT of their learning results, and then by the acceptance team questions, and according to the answer directly, and form the final test scores. The purpose of this is to realize the connection between schools and enterprises in the final examination stage, and feel the working scope and working mode of the enterprise in advance.

The "Excellent engineer" training system based on the "mass entrepreneurship and innovation" certification

Participate in the "double innovation" certification training system students, if can successfully complete the training process of the system, will obtain the "double gen" certification of "excellent engineer" talent training logo, help for students, the certification will be related to the enterprise, this will have great help for students' employment, is also a proof of students' ability; if the students cannot complete the certification for personal reasons within a certain period of time, will flow out of the training system, and return to the original class.

INNOVATION POINT OF THIS PAPER

The innovation points of this paper include three aspects:

(1) Based on the original training program, the curriculum system is flexible

On the one hand, do not change the original training scheme of professional basic course, professional basic course decided to cultivate students' basic ability and basic quality, change professional basic course, means that students do not conform to the basic requirements of the professional, on the other hand, according to the requirements of the Ministry of Education professional set to the

arrangement of professional basic course, also conform to the basic policy of the country.

(2) Add and adjust some courses to better meet the requirements of "mass entrepreneurship and innovation"

Some of the courses that reflect the requirements of "mass entrepreneurship and innovation" will be adjusted to professional courses, and the other will be added on the basis of basic courses and core courses. The increased credits of these courses will not be too high, but the examination (trial) will be improved. Such as normal elective courses, if the student assessment, however, can not choose to take the course, directly to take other courses, but this course training system requires students once took the "double gen" characteristic course, examination not pass must take make-up exam, even repair, until through, otherwise do not give "double gen" characteristic certification. If a student fails to pass some courses during the learning process, it means that the student does not meet the requirements of the characteristic class of "mass entrepreneurship and innovation", and he can return his information to the original class at any time and follow the original class to complete the education and teaching process.

(3) Multi-level and three-dimensional assessment system

On the one hand, vigorously expand the qualification examination space, provide students with a lot of timely information, actively guide students to practice qualification examination and certification test, on the other hand allows other test / game scores instead of related course final exam scores, such as through some qualification examination, programming competition, system modeling competition to offset the final exam, which can replace the level of the fourth semester English final, even including other professional games, such as football, basketball games, etc., make the test content is rich, at the same time make different types of students have the space of development.

CONCLUSION

Through the implementation of "excellent engineer" talent training under the integration of "mass entrepreneurship and innovation" for some students in the electronic information category, Take innovation into all stage of talent training, From the design of training program, the reform of teaching mode, the optimization of examination (trial) process and method, An integrated teaching system with the full participation of enterprises, Greatly stimulated the students' interest in learning, Enhance the teachers' interest in teaching, Corporate recognition and expectations of students have also been greatly improved, Students' innovation and practical application ability have been significantly enhanced, It fully reflects the effectiveness of cultivating the "excellent engineer" talent training mode with

innovative consciousness of electronic information, This will improve the training scale of high-tech information personnel in China, Shorten the period of talents from the university training stage to the investment in scientific research and industry, It is of great significance to train more high-level talents in short supply in countries.

REFERENCE

- Dong Wenzheng, Li Yanhong, Huangtao. Discussion on the innovation and entrepreneurship education mode in colleges and universities in the new media era [J]. *Public Relations World*, 2022 (07): 115-116.
- Fan Yan. Analysis on the optimization path of "mass entrepreneurship and innovation" education in new engineering universities [J]. *Adult Education in China*, 2020 (21): 44-46.
- Gao Haitao, Zhang Yongfeng. Exploration of the talent training path of outstanding engineers [J]. *Journal of Dalian Minzu University*, 2021,23(06):574-576.
- Hua Zheng. Exploration and practice of software talent training mode under the background of Excellent Engineer training [J]. *Electronic components and Information Technology*, 2021,5(12):98-99.
- Hui WANG, Chunxiao CHEN. Research on Perfecting Innovation Policy and Solving the Dilemma of Private Innovation in the Context of "Mass Entrepreneurship and Innovation"[J]. *Asian Agricultural Research*,2020,(11).
- Yijing Chen. Research and Practice on Distinguished Engineer in Specialty of Measurement and Control Technology and Instrument[A]. *Intelligent Information Technology Application Association. Proceedings of 2011 Third Pacific-Asia Conference on Circuits, Communications and System (PACCS 2011 V1)* [C]. *Intelligent Information Technology Application Association*,2011:4.
- Liu Zhaolin.Take the textile Engineering major of Hebei University of Science and Technology as an example [J]. *Chinese and foreign entrepreneurs*, 2020 (12): 180.
- Pu Yong, Han Tao, Wang Jun. Exploration and practice of talent training of "Excellent Engineer" in a local university [J]. *Education modernization*, 2018,5(01):16-18.