ATLANTIS PRESS

Advances in Social Science, Education and Humanities Research, volume 369

2nd International Conference on Humanities Education and Social Sciences (ICHESS 2019)

Comprehensive Curriculum Reform of Intelligent Manufacturing in Colleges and Universities Serving Local Areas

J. L. SU

TSL School of Business, QuanZhou Normal University, 362000, QuanZhou, P. R. China

*su_jinlong @hotmail.com

Keywords. Intelligent manufacturing; Service place; Personnel training

Abstract. This paper is the practice and discussion of the comprehensive course reform of Intelligent Manufacturing in Colleges and universities. Under the background of intelligent manufacturing development in our country, This paper first expounds the significance of offering comprehensive and specialized courses of Intelligent Manufacturing in local colleges and universities in serving local economy, then the author analyzes the general idea and conception of the reform of the intelligent manufacturing course in the university, then according to the author's attempt in the course of work and, share of intelligent manufacturing teaching practice exploration and achievements, finally, combining the practice of curriculum setting up, the author puts forward the comprehensive curriculum reform was carried out with the improvement of experience.

1. Introduction

At present, the research on intelligent manufacturing at home and abroad has been relatively mature, and the application of intelligent manufacturing technology in enterprises has become the new normal. Higher education personnel training and research contents cover all aspects of the field of intelligent manufacturing research, showing a multi-perspective, dynamic trend, multidisciplinary integration; In terms of talent cultivation and research methods of higher education, qualitative research methods such as conceptual elaboration and theoretical discussion in the early stage have gradually shifted to experimental methods and quantitative analysis methods such as computational simulation, data investigation and case study. Talent cultivation and research background have begun to pay attention to the impact of different humanistic and social environments on intelligent manufacturing, which conforms to the trend of interdisciplinary and cross-cultural development of intelligent manufacturing and enhances the pertinence of the research. Since the release of the advanced manufacturing strategy, the United States has issued specific policies on technology research and development, technology transfer and related supporting policies (tax incentives, talent education, business investment, special funds, etc.), and invested a large amount of funds to accelerate the implementation of the strategy. Since 2012, the us has invested more and more in manufacturing, especially advanced manufacturing. In 2013, the U.S. advanced manufacturing research and development budget was $2.2 billion, with the national science foundation (NSF), department of energy (DOE), national institute of standards and technology (NIST) and others increasing their budgets by more than 50%.

As China's economic development enters the new normal, the country vigorously implements the innovation-driven strategy. Manufacturing industry is the main part of the national economy, and industry 4.0 is the fourth industrial revolution led by intelligent manufacturing. "Made in China 2025" is released on May 8, 2015 by the state council to strengthen the national strategic planning of high-end manufacturing, is our country to carry out the strategy of manufacturing nation the first decade of the programme of action, its guiding ideology is to fully implement the party's 18 large and 18 fourth plenary session of 2, 3, spirit, adhere to the new path of industrialization with Chinese characteristics, in order to promote innovation and development as the theme, manufacturing to quality, and the efficiency as the center, to speed up the depth of a new generation of information technology and manufacturing integration as the main line, in order to promote the intelligent manufacturing as the main direction, in order to meet the economic and social development and national defense construction of major technical equipment demand as the goal, We will strengthen the basic industrial capacity, improve the comprehensive integration level, improve the multi-tiered and multi-type personnel training system, promote industrial transformation and upgrading, cultivate a manufacturing culture with Chinese characteristics, and realize the historical leap of the manufacturing industry from great strength to great strength.

With the growing trend of economic and information-based globalization, manufacturing industry has to face the increasingly fierce competition as well as the frequent and unpredictable market fluctuations. An Agile theory thereupon emerges as the requirement of global market fluctuations. The life cycles of products are shortened and the pace of the product renewal is quickened, and the demands of customers are becoming more and more specific and diversified, thereupon, the producing and organizing models transfer from

product-oriented to customer-oriented, requirement-oriented and service-oriented, and the aims of enterprises transfer from enterprise profit-driven to market and social profit-driven. The key for enterprise to gain its markets and customers is to improve some factors, such as time, quality, cost, service and environment. Agile Enterprise and Manufacturing Enterprise Alliance, as the running models of future enterprises, will fully make use of new technologies and coordinated operation which is more agile, compartmentalized, order-driven and dynamic to adapt to the markets.

The relationship among Agile Manufacturing Enterprise, Agile Supply Chain and Agile Infrastructure is like the relation between the sharpness of knife and the knife itself, which cannot be divided apart. Agile Infrastructure for Manufacturing System is the platform where the Agile Enterprise, Agile Supply Chain, Agile Manufacturer, Virtual Enterprise are put to good use. The essential condition of Agile Enterprise and Virtual Enterprise is the Agile Infrastructure which is reliable, cross-enterprise, cross-industry and trans-regional. The Agile Infrastructure is established to normalize the managerial practices of enterprise, such as production, sale, policy-making, financial affairs and personnel affairs. The member enterprises can be inserted flexibly, just like the circuit module with standard output and input jacks. In the Agile Infrastructure, member enterprises run business with common rules and establish dynamic Agile Enterprise Alliance, i.e. Virtual Enterprise. The members of Agile Enterprise Alliance negotiate abiding by common rules and accomplish the task of production and sale, which is a game of cooperation. According to the outside market environment and the group intention of inside members, the Virtual Enterprises make identical judgment and macrocosmic layout.

In this paper, the authors research into the comprehensive curriculum reform of intelligent manufacturing in colleges and universities serving local areas. It is supported by the achievements of some projects, such as the "'Introduction to E-Commerce' Provincial Quality Open Online Course Project" (Project Number: QZTCJWC20180103) which is funded by the education department of FuJian province, the "Overseas Visiting Scholar Program of FuJian Province Academic Leaders Training Program" which is funded by the education department of FuJian province, the "Intelligent Manufacturing Majors in Colleges and Universities Serve Local Education Reform" (Project Number: FBJG20170210) which is provincial educational reform program and funded by the education department of FuJian province, the "Joint Research on Agile Manufacturing Key Technologies" (Project Number: 201708) which is funded by QuanZhou science and technology association.

This paper， which lays emphasis upon the comprehensive curriculum reform of intelligent manufacturing in colleges and universities serving local areas. The overall organization of the paper is as follows. After the introduction, in Section II we present the current situation of Economic development in FuJian, and it lists a lot of data and charts. With the economic development of FuJian, enterprises, especially private enterprises, urgently need a large number of high-quality comprehensive industrial talents oriented to intelligent manufacturing.If colleges and universities can offer relevant majors in the direction of intelligent manufacturing as soon as possible and build a whole system of targeted courses according to the needs of the market and enterprises, it will greatly promote the local economy. Develop intelligent manufacturing professional group of practical significance in FuJian local colleges and universities are clarified in section III. In section IV, several reforms of the core curriculum of intelligent manufacturing, are touched upon. In Section V, the authors elaborate The main practice and trial in the course opening. After that, The experience of curriculum reform and some ideas of improvement is introduced in Section VI; Finally, Section VII concludes the paper.

2. Current Situation of Economic Development in FuJian

Private enterprise holds the balance in FuJian economy position. After years of development, private enterprises in FuJian have undergone great changes in their management system and operating mechanism, which have greatly improved their vitality and competitiveness. Under the new normal, there are still many institutional, institutional, structural and historical problems that private enterprises need to further solve and they are becoming increasingly difficult. In the macro environment where the new round of scientific and technological revolution and the transformation and upgrading of China's manufacturing industry form a historic intersection, FuJian, as one of the most active regions for private enterprises in China, must seize the historical opportunity, give full play to its advantages, transform and upgrade in an all-round way, and stride into the ranks of the strong manufacturing provinces in China. In 2018, the GDP of FuJian reached 3,580.404 billion yuan, an increase of 8.3 percent or 0.2 percentage points over the previous year in comparable prices. By sector, the added value of the primary industry was 237.982 billion yuan, up 3.5%; The added value of

the secondary industry was 1723.236 billion yuan, up 8.5%; The added value of the tertiary industry was 1619.186 billion yuan, up 8.8%.

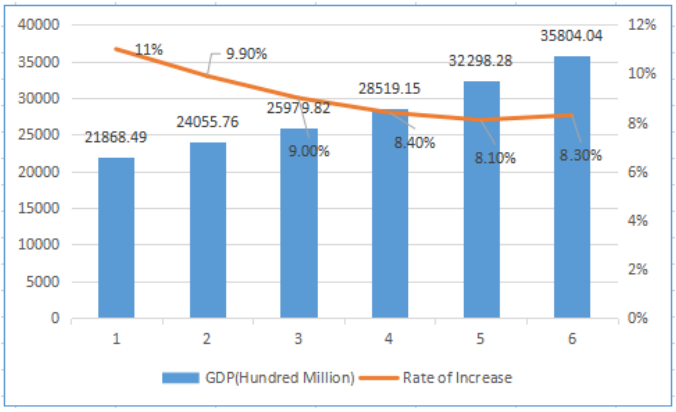

Figure 1. Total GDP of FuJian province and its growth rate from 2013 to 2018
(The data are from the China Business Industry Research Institute database)

In 2018, the added value of industries above the designated size in the province increased by 9.1 percent or 1.1 percentage points over the previous year. The value added of light industry increased by 8.9 percent and heavy industry by 9.2 percent. By type of registration, the added value of state-owned enterprises increased by 7.8 percent, joint-stock enterprises by 10.3 percent, joint-stock cooperative enterprises by 14.4 percent, and enterprises with foreign investment and investment from Hong Kong, Macao and Taiwan by 6.9 percent. The value added of the mining sector grew by 7.8 percent, the manufacturing sector by 8.9 percent, and the power, heat, gas and water production and supply sectors by 11.9 percent. However, under the background of the us-china trade war, our province is faced with the new normal of intensified market competition, traditional overcapacity, strengthened resource and environmental constraints, and rising cost of factors, the development of our manufacturing industry is also faced with severe challenges, and the transformation and upgrading is urgent.

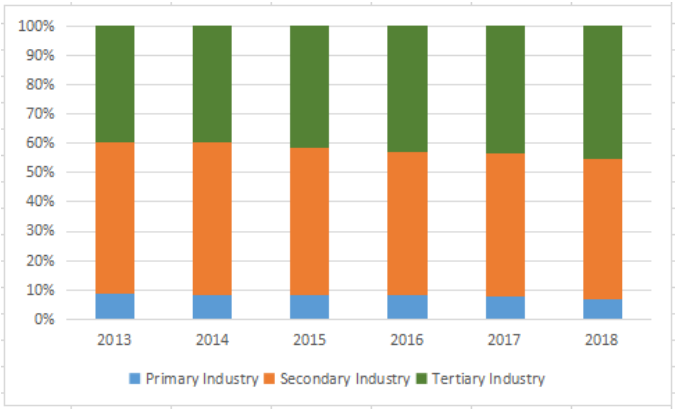

Figure 2. The proportion of added value of the three industries in GDP of FuJian province from 2013 to 2018
(The data are from the China Business Industry Research Institute database)

The number of small and medium-sized enterprises in China accounts for more than 99% of the total number of enterprises in the country. They are the fresh force of China's economic development and play an important role in promoting economic growth, relieving employment pressure and maintaining social stability. FuJian province, especially FuJian minnan area, is one of the most active places for the development of private enterprises in China. In the past 40 years since the reform and opening up, the number and scale of private enterprises in FuJian have been growing rapidly year by year. Private enterprises have become one of the main driving forces for the economic development of FuJian, especially in southern FuJian. In 2018, the ex-factory price of industrial producers in the province rose 2.8 percent, or 1.3 percentage points less than that of the previous year. December was up 2.4% from a year earlier and down 0.6% from a month earlier. In 2018, the purchase prices of industrial producers rose 2.8 percent year-on-year, or 2.5 percentage points less than the previous year. December was up 1.2% from a year earlier and down 1.0%

from a month earlier. FuJian province still has great potential in the manufacturing industry, so the development of intelligent manufacturing education in FuJian universities must be able to serve the local economy well.

3. Develop Intelligent Manufacturing Professional Group of Practical Significance in FuJian Local Colleges and Universities

As an advanced manufacturing base on the west coast of the strait, "QuanZhou manufacturing" is a famous name card, QuanZhou manufacturing in clothing, footwear and other fields of products also sold well in the world. This also supported the private economy with an average annual growth rate of more than 30%, creating the famous "jinjiang experience" and "QuanZhou model". According to the roadmap defined by "made in QuanZhou 2025", in the next decade, QuanZhou will strive to build a world-renowned manufacturing research and development and production base, listed in the top ten cities of China's manufacturing development. QuanZhou will implement 17 industrial transformation and upgrading roadmap, implement traditional industry transformation and upgrading action and emerging industry multiplication plan, and strive to achieve greater breakthroughs in key areas and key links of the industrial chain. At the same time, accelerate the implementation of "made in QuanZhou 2025", vigorously promote the "machine replacement" as the core of the intelligent transformation, actively and steadily promote enterprise mergers and reorganization, reduce excess capacity, promote the manufacturing industry to the high-end extension. Advanced equipment and technology, but also ultimately rely on human operations. Expensive introduction of advanced equipment, only a few skilled workers through training can operate. Affected by low cultural quality and operation skills, the average utilization rate of imported equipment is only about 70%. The low quality of workers and the shortage of skilled talents have affected the quality and image of China's manufacturing industry. The introduction of equipment is to build a platform with international standards, can make good use of this platform, but also rely on advanced technology and talent.

Professional group of our school management as a whole, the overall construction, cultivating intelligent manufacturing fusion between colleges, high-quality "double double" teachers, refactoring docking intelligent manufacturing sharing across professional curriculum system, the implementation of real tasks, use of case teaching, the depth of unit of choose and employ persons to participate in the main specialized courses, outstanding practice ability teaching reform, the construction of innovative and advanced characteristic teaching material and teaching case, union construction between colleges laboratory and practice base and face-to-face production-teaching-research combination comprehensive training center, build excellent practice teaching and scientific research platform, Improve the students' professional quality, professional knowledge, innovation, practical ability and the employment competitive power, improve the engineering graduate in intelligent manufacturing and numerical control generation of talent training, service area of the development of applied research and technology innovation ability, the typical in the local construction of services, and in the province and even the domestic higher education reform and innovation has certain exemplary role.

4. Several Reforms of The Core Curriculum of Intelligent Manufacturing

Firstly, the specialty setting and adjustment planning of the specialty group. On the basis of the existing majors, the professional group will set up new majors and professional direction, so as to upgrade the professional setting and build a professional group connecting QuanZhou intelligent manufacturing and CNC generation industry. At present, electronic information science and technology and communication engineering majors set up information processing, wireless communication, optical fiber technology, communication network and exchange four directions; Computer science and technology majors set five directions: Internet of things, big data, cloud computing, virtual reality and mobile Internet. This professional group of chain according to QuanZhou intelligent manufacturing and CNC generation demand for professional innovation skills applied talents, increase the Internet of things engineering, electrical engineering and intelligent control, automation and machinery manufacturing, and set the gradual refinement for professional direction of the industrial chain, gradually establish a perfect satisfied service where the innovation of the industrial chain of industries related to actual applied technology talented person's demand.

Secondly, talent training mode reform. The goal of the talent training mode reform of this major group is to meet the requirements of applied talents for undergraduate courses in the intelligent manufacturing and CNC generation industry, deepen the cooperation between universities and enterprises, and implement the reform of "3+1" talent training mode. Professional group of the talent training scheme of reform on the basis

of the national standards for undergraduate teaching quality and reform of college students' innovative entrepreneurial education requirements, stick to QuanZhou, intelligent manufacturing and generation of nc industry development needs, based on the capability of a new generation of information technology practice, service position requirements and improve the professional ability as the guidance, refactoring professional curriculum system, the formation of innovation, coordination, open the talent training scheme, on the way to carry out the talents cultivation.

Thirdly, curriculum system reconstruction. Reconstructing curriculum system, professional skills curriculum system and school-enterprise cooperation curriculum system in line with the development needs of intelligent manufacturing and CNC generation industry. On the one hand, curriculum reform is driven by industrial technological progress; On the other hand, the curriculum system embodies interdisciplinary characteristics. Aiming at the nine supporting technologies of intelligent manufacturing, promote the docking of course content and professional standards, implement the reform of course system, and ensure that the course system of group majors can meet the post requirements of undergraduate talents in intelligent manufacturing and CNC generation industry.

Fourthly, teaching reform. Formulation and implementation of the professional group of teaching management reform, promote the deepening teaching reform, in order to improve the students' ability of practice ability, innovation ability and the employment as the guidance for the reform of teaching content and practice content, ensure the main professional course participation rate reached 100%, unit of choose and employ persons professional real tasks, use of case teaching in the coverage reached 100%, using the MOOC, micro class, flip type classroom lessons such as construction of intelligent manufacturing course teaching case and high quality teaching resources sharing platform, School-enterprise cooperation to build innovative, advanced intelligent manufacturing characteristics of the teaching materials, promote the sustainable development of intelligent manufacturing personnel training, the formation of a number of high quality research results.

Fifthly, practice teaching condition construction.We should increase investment in the construction, coordinate various experimental teaching resources, and build a professional group of intelligent manufacturing related experimental teaching room. Join hands with regional intelligent manufacturing enterprises to build a number of off-campus internship and training bases, campus intelligent manufacturing training center. The key reform focuses on the practical teaching link, based on the industrial enterprise project, to strengthen the students' post awareness, training students' professional practical ability. We will promote the organic combination of professional education and innovation and entrepreneurship education, organize cross-disciplinary student teams, participate in disciplinary competitions and scientific research activities, and cultivate students' comprehensive ability of innovation and entrepreneurship.

Sixthly, the construction of teaching staff. We will strictly implement the policy of "increasing the number of teachers", and introduce more than 30% of full-time teachers to the teaching staff of service intelligent manufacturing industry, including senior technical personnel, r&d personnel, senior management personnel, successful entrepreneurs, excellent alumni, and teachers from universities cooperating with FuJian and Taiwan. Culture and introduction, the combination of professional "can double double type" teachers accounted for more than 50% of the full-time teachers, strive for the introduction of intelligent manufacturing high-level personnel, to build a both teachers, engineers and other qualifications, teaching ability, practice ability and professional "can double double type" teachers, improvement of regional development of applied research and technology innovation ability, etc.

Seventhly, quality assurance system construction. The quality assurance system for the construction of professional groups shall be formulated, the teaching quality standards for application-oriented majors shall be established, and the teaching quality assurance system for majors shall be improved. To ensure the smooth implementation of "change in the way of talent training, upgrade in the professional setting, change in the curriculum system, change in the faculty allocation and change in the teaching management mechanism".

5. The main practice and trial in the course opening

Firstly, select outstanding students from multiple majors to try to open classes together. The "intelligent manufacturing pilot class" composed of excellent students majoring in electronics, communication and computer has been established and carried out teaching reform in multiple dimensions, such as teaching and research integration, school-enterprise cooperation and school-research cooperation. Intelligent manufacturing courses are mostly multi-disciplinary comprehensive professional courses, which often

involve mechanical manufacturing, automation, electronics, electrical, communication, computer and other subjects. The teaching content often involves software and hardware, strong current and weak current at the same time, so comprehensive and professional courses are very strong. Is also the first attempt to open such a course in our school, we from the electronics, communications, computers, and other professional extract the outstanding student in class teaching, to partial software class students emphasize teaching hardware knowledge, to the partial students focus on software and hardware algorithm, to partial weak current knowledge of heavy current students, combined with the enterprise actual project to arrange students to curriculum design, curriculum process is the personal knowledge of the teacher and the challenges of the comprehensive practical ability.

Secondly, try to take curriculum as the basic element of school-enterprise cooperation. During the course of teaching, we tried for the first time to conduct extensive school-enterprise cooperation with the curriculum as the basic element. In the course of course opening, we have signed strategic cooperation agreements with many well-known enterprises such as jiatai numerical control, and established close ties with other leading enterprises such as QuanZhou southern roadbed. After multiple communications, Recommended by the south road machinery co., LTD., chairman of FuJian, FuJian iron billiton machinery co., LTD., FuJian sheng da machinery co., LTD, FuJian tobacco machinery co., LTD., QuanZhou lida machine co., LTD., FuJian province jin machinery co., LTD., FuJian jinjiang Ji dragon machinery industrial co., LTD., qunfeng intelligent machinery co., LTD, QuanZhou tengda precision casting co., LTD., QuanZhou source machinery technology co., LTD., FuJian spring industry co., LTD., and new materials co., LTD., QuanZhou huade mechanical and electrical equipment co., LTD., QuanZhou strength of engineering machinery co., LTD., QuanZhou hengtong machinery accessories co., LTD., QuanZhou seven new mechanical and electrical The board of directors of intelligent manufacturing professional group composed of directors of limited company and other companies; Recommend kingbox (FuJian) automation technology co., LTD, QuanZhou male hui machinery industry and trade co., LTD., jinjiang kaijia machinery manufacturing co., LTD., jinjiang city, FuJian province, and sheng machinery co., LTD., jinjiang first of machine co., LTD., FuJian dragon machinery co., LTD., QuanZhou sea ender electrical and mechanical technology development co., LTD., fackel machinery (FuJian) co., LTD., QuanZhou xin cheng machinery equipment co., LTD., Bohr (QuanZhou) measurement and control technology co., LTD., QuanZhou precision machinery co., LTD., FuJian jinjiang flourishing printing and dyeing machinery co., LTD., QuanZhou constant lida engineering machinery co., LTD., in the Ming (FuJian) machinery co., LTD., FuJian South China heavy machinery manufacturing Co., Ltd., jinjiang new feng yuan machinery Co., Ltd., yi bin (QuanZhou) environmental protection technology development Co., Ltd, shishi city bada electric automation Co., Ltd., QuanZhou pine hing intelligent equipment Co., Ltd., FuJian zhonglian bo gen robot technology Co., Ltd., FuJian yu bang metal surface treatment equipment Co., Ltd., QuanZhou carp evergreen mold factory, jinjiang city hing wing machinery Co., Ltd., the crown (FuJian) mechanical technology development Co., Ltd., FuJian SBS Zipper Science&Technology Co., Ltd, chairman of the board of directors of the company or the general manager for intelligent manufacturing professional group of experts steering committee.

Thirdly, try to introduce diversified teaching.

The course teaching process works closely with local research institutions, universities, local well-known enterprises and industry associations to try to get closer to the practice of diversified teaching oriented to local intelligent manufacturing industry. In the teaching process, we have hired engineering technology research institute of Harbin institute of technology, hercynian research institute of Chinese academy of sciences institute of equipment manufacturing in QuanZhou, QuanZhou QuanZhou city institute of huazhong university of science and technology of intelligent manufacturing, equipment manufacturing industry association, the famous universities, domestic well-known teaching institution, QuanZhou well-known entrepreneurs and engineers came to teach the students and to participate in the teaching plans, course construction, textbook compilation. As a teaching teacher, the author is working with many enterprises and scientific research institutions to jointly write several professional course textbooks.

Fourthly, try to introduce the teaching content close to the frontier of science and technology. At the beginning of the course, well-known experts and scholars from home and abroad are often invited to talk about the frontier of technology and market for my classmates, so that our teaching content can be updated closer to the frontier of science and technology. The content of the lecture usually combined with the local economic and technological prospects, invited well-known experts and scholars to do "QuanZhou equipment manufacturing status quo and the application of numerical control technology" and "manufacturing basis of textile industry intelligent manufacturing/practice research: Yarn breakage detection algorithm research, the intelligent manufacturing base of computational intelligence and optimization of industrial processes, the

intelligent robot adaptive control and application of manufacturing base ", "intelligent manufacturing base of robot perception and industrial automatic" and "induction heat treatment technology of intelligent manufacturing base", "industrial intelligent detection technology of intelligent manufacturing base", the step motor technology base and related experiments such as cutting-edge technology lectures, in order to promote students' learning interest, expanding professional knowledge play a positive role.

Fifthly, try a variety of teaching methods. We try to introduce a variety of teaching methods, the field teaching, practical teaching effect is particularly prominent. In the process of the curriculum, we lead the students to China in QuanZhou railway equipment co., LTD., Harbin industrial university engineering and technology research institute, Chinese academy of sciences academy of hercynian equipment manufacturing research of QuanZhou, FuJian zhonglian bo gen robot technology co., LTD., jia tai CNC co., LTD., and other enterprises and scientific research institutions in the scene teaching, field observation and study for some large cutting-edge equipment. In addition, we also hired well-known domestic teaching institutions to our class. Among them, the technician of zhongru-jida co., ltd. led the whole class to complete the relevant experiments of sensors, sensor network, C51, ARM, ZigBee, networking and bluetooth technology. The technician of new world limited company helped all my classmates to complete the application experiment of Internet of things. Huaqing farsight information technology co., LTD. Engineers for my class to explain ARM, C51 and other integrated application system programming.

Sixthly, try to introduce practical projects into the curriculum. During the course offering, we divided the students into groups and participated in the actual research and development projects of several research institutions, such as hexi equipment manufacturing institute of Chinese Academy of Sciences, suzhou branch of Chinese Academy of Sciences/technical university of Munich, Shanghai electric co., LTD. / Shanghai branch of Chinese Academy of Sciences, and tried to drive the course teaching with practical projects. And use graduation internship opportunities in the end of the course, the excellent students to travel to suzhou, hercynian equipment manufacturing research institute of Chinese academy of sciences of Chinese academy of sciences, Shanghai a kun electric engineering co., LTD., fuzhou blessing photoelectron co., LTD., FuJian zhonglian bo gen robot technology co., LTD., FuJian province, cane intelligent technology co., LTD., to participate in the actual research and development projects. At the same time, I organized students to actively apply for various competitions. Under the joint leadership of the tutors in the professional group and the tutors from the Chinese Academy of Sciences and enterprises, I have achieved many excellent results in the provincial and national competitions.

6. The experience of curriculum reform and some ideas of improvement

Combined with the practice of setting up intelligent manufacturing courses, the author carries out the following experience and improvement ideas for the reform of such comprehensive courses:

Firstly, the teaching management reform program should be formulated to support the construction of the professional group.

Secondly, the introduction of outstanding enterprises and technical personnel and management personnel as a teacher, make the main specialized course of unit of choose and employ persons participation rate reached 100%, has signed a cooperation of companies are: hercynian research institute, Chinese academy of sciences (QuanZhou equipment manufacturing research institute), huazhong university of science and technology of QuanZhou institute of intelligent manufacturing, jia tai nc, and other enterprises.

Thirdly, the curriculum syllabus, experimental syllabus and examination syllabus should be comprehensively revised, curriculum teaching content should be reformed, teaching methods and evaluation system should be explored and innovated, so that the coverage rate of teaching professional courses with real tasks and real cases could reach 100%, and the teaching case database of intelligent manufacturing courses should be built.

Fourthly, do a good job in teacher training, so that teachers' teaching tasks and their own development closely combined, inspire teachers to consciously carry out teaching reform, the implementation of the teaching process to solve practical problems and student-centered heuristic, cooperative, project-based, special competition teaching mode.

Fifthly, complete the construction of professional core curriculum network resources, and build a high-quality teaching resource sharing platform with the help of the school's high-quality curriculum information platform.

Sixthly, reform practical teaching content, methods, means and enterprises highly involved in the evaluation system, improve students' practical ability.

Seventhly, the enterprise technical innovation project as an important carrier of application-oriented personnel training, improve the innovation ability of students.

Eighthly, take the front-line needs of industrial enterprises as the source of graduation design topics to improve students' employability.

Ninthly, in the professional core courses and enterprise cooperation courses, we have developed some experimental curriculum reform projects, such as MOOC, micro-class and flipped classroom, to improve the teaching effect.

Tenthly, set up the pilot class of multi-major cooperation, embody the innovative and advanced education concept in the construction of school-enterprise cooperation, cooperate with local enterprises in the practice of intelligent manufacturing, establish various practice bases, and cultivate graduates with balanced theoretical ability and practical ability.

7. Conclusion

This article is the practical experience and discussion of the comprehensive course teaching reform of intelligent manufacturing. As the only pilot city of "intelligent manufacturing and numerical control generation" in China, QuanZhou region urgently hopes that local colleges and universities can offer comprehensive courses of intelligent manufacturing with practical significance for engineering experiments of enterprises. The author in colleges and universities actively try to set up such a course, this paper expounds the intelligent manufacturing course of the reform of the overall train of thought and ideas, and then combined with the author in the process of the curriculum of efforts and attempts to share the intelligent manufacturing course teaching practice exploration and results, finally the author based on the curriculum practice of intelligent manufacturing class curriculum reform has carried on the experience summary, for a comprehensive professional courses in colleges and universities provides a new train of thought.

References

[1] Xie Miao. Exploration of innovative classroom teaching mode in local application-oriented undergraduate universities -- a case study of Java programming course of yulin normal university [J/OL]. Education modernization,2017,(41):1

[2] Shen Yanjin, Zhang Kun. Study on the development status and countermeasures of vocational education under the background of "made in China 2025" [J/OL]. Adult education,2017,(10):58-61

[3] Zhao Hong, Zheng Qinhua, Chen Li. Research on the construction and development of MOOCs in China: current situation and reflection [J/OL]. China distance education,2017,(7):1-8

[4] Zhang Zhixuan. Study on evaluation system of practical courses of product design major in application-oriented universities [J/OL]. Art & technology,2017,(7):1

[5] Huang Yongrong, He Hengyu, ding lili. Research on curriculum reform in colleges and universities based on improving students' practical ability [J]. Heilongjiang higher education research,2014,(05):153-155.

[6] Li Zinlu, LAN Zin. Discussion on curriculum reform in universities from the perspective of improving school effectiveness [J/OL]. China training,2017,(6):1-2

[7] Xui Zhucui, Cu Xin, Chen Xiaoqiao, He Saixian. Deepening the comprehensive reform of undergraduate teaching and improving the quality of talent training -- practicing the idea and experience of "excellent engineer education and training plan" [J/OL]. Experimental science and technology,2017,(7):1-5