# Research on Cultivation of Internet+ Innovative and Entrepreneurial Talents

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**Abstract.** It is of significant importance to cultivate innovation and entrepreneurship ability of contemporary university student under the background of "Internet+" and "mass entrepreneurship and innovation". The university-enterprise cooperation is a necessary approach for cultivating practical innovative and entrepreneurial talents in advanced vocational colleges. This paper describes the practical experience of cultivating innovative and entrepreneurial talents based on university-enterprise cooperation in Internet+ era on the basis of analyzing current situation of cultivating innovative and entrepreneurial talents, and focuses on expounding the innovation and entrepreneurship reform mechanism, the great achievements made in the innovative and entrepreneurial talent cultivation program, and the key roles in the construction of quality colleges.

**Keywords:** Internet+ · Innovation and entrepreneurship · Personnel training

## 1 Introduction

Premier Li Keqiang clearly defined the "Internet+ Movement" plan in the government's work report in March 2015. Actually, "Internet+ Movement" is the new shape and new form of industry of the Internet under Innovation 2.0, as well as the evolution of Internet form driven by knowledge-based social Innovation 2.0. The development of new generation of information technology has hastened the Innovation 2.0, which, in turn, has affected the formation and development of new generation of information technology form, reshaped the new form of new generation of information technology as the Internet, cloud computation and big data etc., further driven Innovation 2.0 in the knowledge-based society featured by user innovation, open innovation, mass innovation and collaborative innovation, changed the way of people's production, working and life, ushered the "new normal" of innovation-driven development [1].

Colleges and universities assume the obligations of teaching and scientific research, have the quality of innovation, and are the cradle of cultivating innovation and entrepreneurship ability of students. With the economization of socialist market and internationalization of economic development, China is greatly demanding a multitude


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of practical professional talents. The output of high-quality professional innovative and entrepreneurial talents has profound influence on regional development and national competitiveness. China's economy has achieved the development at medium-to-high speed, the great upsurge in mass innovation and entrepreneurship has been rising, and the educational research on innovation and entrepreneurship has become a hot issue for research in higher education. Throughout the results of educational research on innovation and entrepreneurship in China, it is confirmed that innovation and entrepreneurship education is contained in the process of talent cultivation with the cultivation objectives of higher education being set up in advance [2]. Through years of efforts, university-enterprise cooperation of higher vocational technical education has achieved initial success. However, it is far from perfection, especially that the state has put forward higher requirements and standards over the development of good higher vocational colleges. It is thus crucial to focus on improving practical teaching quality, cultivating the entrepreneurial awareness of college students, explore the university-enterprise cooperation mode featured by more sound higher vocational education that is distinct from the secondary vocational education, while enhancing the construction of professional theory education.

With the diversified development of higher education nowadays, the university-enterprise cooperation is a necessary approach for cultivating practical innovative and entrepreneurial talents in undergraduate universities. At present, in the construction of quality colleges, the higher vocational colleges should focus on studying following issues: how the university and enterprise should further promote integration of production and education, develop the resources of both Parties, and establish the cultivation mode of innovative and entrepreneurial talents among undergraduates so as to adapt to the "Internet+" era, meet the demand for talents for social construction, and form an education pattern of university-enterprise cooperation with bilateral interaction and virtuous circle.

## 2 Present Status of Cultivation of Innovative and Entrepreneurial Talents

Foreign universities have realized that cultivating innovative and entrepreneurial talents is an essential content of education, achieved adequate social and economic returns from cultivation of innovative and entrepreneurial talents, and integrated innovation into entrepreneurship. Moreover, a relatively mature set of supporting system for innovation and entrepreneurship education has been formed in America, Germany, France, Britain Australia, Switzerland and some other countries. Apart from traditional course teaching, colleges and universities in America have established innovation and entrepreneurship clubs and websites, etc., through which the students could obtain real-time information on entrepreneurship. In Japan, colleges and universities have adopted the innovative and entrepreneurial talent cultivation mode as "integration of officials, production and education", as well as the education mode of "industry research laboratory". The UK government has adopted superincumbent and government-driving mode for the management of innovation and entrepreneurship education in colleges and universities. The innovation and entrepreneurship education

mode in Britain has become relatively mature and achieved prominent results; therefore, innovation and entrepreneurship education has been a major driving force for British economic and social development. In Germany, establishing a combination with close integration between scientific research and production led by higher education has become the common mode for promoting higher education reform and development, developing open education and teaching, as well as cultivating high-quality innovative and entrepreneurial talents in colleges and universities. In Switzerland and Australia, the innovation and entrepreneurship education courses have been commonly offered in their colleges and universities that implement innovation and entrepreneurship education, being aimed at cultivating students to become successful entrepreneurs in the future [6].

In China, the colleges and universities develop innovative and entrepreneurial talent cultivation on the basis of different universities and professional features, or promote educational practices according to regional economy, and then explore talent cultivation mode based on that. There are three major modes: the mode focused on entrepreneurship course education, the mode centered on competition and activities among students, and the mode centered on Entrepreneurship Park or Science Park.

All universities select different talent cultivation modes according to their own school-running characteristics and education resource superiority. Among them, Tsinghua University, Central South University, Yiwu Industrial and Commercial College and other universities at different levels have achieved huge progress in entrepreneurship education through adopting different innovative and entrepreneurial talent cultivation modes. For example, Department of Communications of Northeast Forestry University has adopted the innovative and entrepreneurial talent cultivation mode as "1+1+N Mentor System", where, the first "1" represents the mentor of each class who is hired by the University. The second "1" represents the coordinator of each class who is selected and recruited by mentor group in each Department. Generally, the coordinator of a class should be a professional teacher with stronger professional qualification. The coordinator is responsible for compiling professional study plan for each individual student, and provide them guidance in terms of ideological and moral education, life demands and psychological development, etc. "N" refers to that professional mentor, academic mentor, innovation mentor, entrepreneurship mentor, employment mentor, model mentor and graduation thesis mentor should jointly guide sophomores and above so as to meet demands of individual difference and development. However, the determination of mentors should be realized via two-way selection. The "1+1+N Mentor System" among undergraduates has indeed realized the goal of cultivating innovative and entrepreneurial talents [3] through individualized teaching by different level and category, providing a good reference for the cultivation of innovative and entrepreneurial talents in higher vocational colleges.

However, the cultivation of innovative and entrepreneurial talents in most higher vocational colleges in China starts relatively late, and innovation and entrepreneurship education has only been regarded as an attachment to higher education in many innovative and entrepreneurial talent cultivation modes, thus failing to integrate basic entrepreneurship knowledge and basic quality cultivation with professional education effectively, utilize existing education resources sufficiently, penetrate entrepreneurship education into the entire education and teaching process. In addition, these universities

only add credits related to innovation and entrepreneurship education into talent cultivation schemes. As a whole, the innovation and entrepreneurship education only benefits a small portion of students at present, and there are a lot for universities to concern about, such as the indifference and poor degree of participation to innovation and entrepreneurship among many students. Though there are various discipline competitions developed among colleges and universities, there still lacks attention to innovative learning and entrepreneurship training of undergraduates. Some entrepreneurship projects of undergraduates are just simple commercial activities that are divorced from technical innovation and specialized characteristics [4, 5].

## 3 Practical Experience of Cultivating Innovative and Entrepreneurial Talents Based on University-Enterprise Cooperation in the Internet+ Era

At present, the society is in an information age that is facing the movement, the Internet of Everything and the comprehensive cross-border integration. The Internet thinking is changing the industry dynamics, which requires further integration between the information industry traditional industries. Since 2015, the College has made outstanding achievements by setting up BIM School and laboratory, cultivated more than 30 BIM supervisors, and trained nearly 500 students who have mastered BIM technology.

In addition, through the construction of the ICT innovation base with integration of production and education, the School of Computer and Communication Engineering has cooperated with ZTE Corporation to jointly made cooperative explorations on the transformation and development of the university with application-oriented technology. What's more, the College also jointly establish a practical teaching and scientific research platform for information communication technology with complete functions, jointly set up and operate specializations that can fully realize the education based on university-enterprise cooperation, jointly build the cooperative scientific research system for win-win results and development between the university and enterprise, promote the core competitiveness of teaching and scientific research of the professional teachers team, establish the innovative and entrepreneurial talent cultivation mode among undergraduates, change the traditional single campus classroom teaching mode so as to truly realize the connection between the theory and practice, as well as the open education of integrating curricular and extra-curricular teaching, which is undoubtedly the most effective way to cultivate innovation and entrepreneurship ability of students, improve the quality of talent cultivation, and guarantee the high-end employment of students.

In 2017, the College was selected as pilot unit of the second batch of modern apprenticeship system under the Ministry of Education (MOE). Since taking the project of "MOE- ZTE ICT Innovation Base with Integration of Production and Education" as an opportunity, the network majors have given full play to industrial advantages of ZTE Corporation in the field of ICT, and explored the innovation of innovation and entrepreneurship cultivation among undergraduates under the framework of Ministry of

Education-ICT integration of production and education of ZTE Corporation. On one hand, we have jointly established specializations, compiled talent cultivation schemes, cultivated high-level double-professionally-titled teacher team, promoted practical teaching base, and developed teaching reform and research on new innovation projects in the way of university-enterprise cooperation. On the other hand, with the architectonic-electrical majors as the representative, the College have defined specifications for cultivating innovative and entrepreneurial talents from engineering specializations, explored theoretical and practical teaching modes as well as the education mode based on university-enterprise cooperation for innovation and entrepreneurship by taking two engineering disciplines of computer science and technology and electronic information engineering as the pilot project so as to attract the participation of students from perspectives of technology R&D, innovation projects, etc.

In the process of innovative and entrepreneurial talent cultivation, we have fully utilized the education resource and other relevant resources of schools, enterprises and the society, as well as advanced information communication technology to cultivate scientific and technological innovation sense of students, improve their technical ability, and integrate innovation and entrepreneurship education into talent cultivation schemes so as to realize the new mode of innovation and entrepreneurship cultivation in the "Internet+" era, which is "led by the enterprise, giving priority to the university, participated by teachers and students, and implemented in the university". Through the base construction, we have promoted the new mode of innovative and entrepreneurial talent cultivation, improved the connotation construction level of specializations, improved the scientific research and technical service abilities of teachers, and enhanced the innovation and entrepreneurship awareness of students.

### 3.1 Innovation and Entrepreneurship Reform

**Optimize the Quality Standard for Cultivating Innovative and Entrepreneurial Talents**

We have established the curriculum system for innovative and entrepreneurial talent cultivation based on university-enterprise cooperation, and integrated innovation and entrepreneurship thinking, methods and contents into general courses, discipline basic courses, professional basic courses, specialized course, professional selective courses and general selective courses according to specialized characteristics in each industry. We have established the innovative and entrepreneurial talent cultivation system with integration of "study, innovation, research and application" so as to cultivate the innovation awareness, thinking and competence, as well as entrepreneurship spirit and capacity of students. Meanwhile, we have set up new courses as "Fundamentals of Entrepreneurship", "Guidance for Career Development and Employment of Undergraduates", etc., invited experts and technicians from different enterprises in different industries to convey ideas of frontier dynamics of the discipline to students, and set up the entrepreneurship guidance course for students with entrepreneurial intention. See Fig. 1 for the curriculum system for cultivating innovative and entrepreneurial talents.

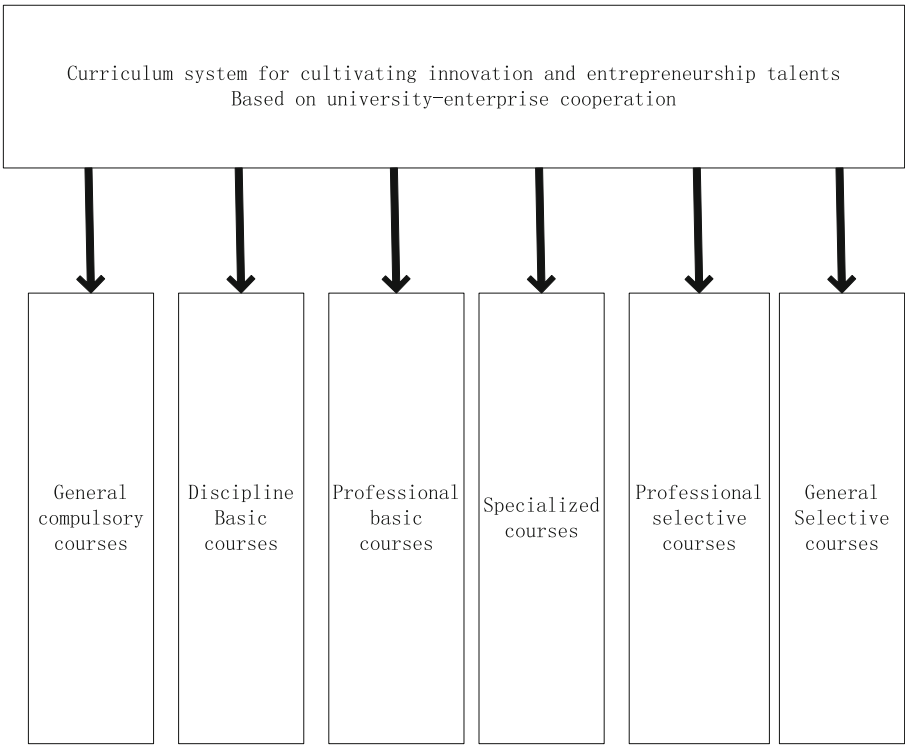


**Fig. 1.** Curriculum system for cultivating innovative and entrepreneurial talents based on university-enterprise cooperation

**Optimize Practical Teaching System**

According to the curriculum system for innovative and entrepreneurial talent cultivation based on university-enterprise cooperation, as well as the innovative thinking of students and demands on cultivation of practical ability, the practical teaching system for innovative and entrepreneurial talent cultivation based on university-enterprise cooperation is comprised by three parts, namely, the basic practice course, professional practice course and comprehensive practice course. Apart from experimental course teaching, there is centralized practical teaching link, which specifically involves curriculum design, comprehensive experimental training, social practice, engineering training in enterprise, and internship after graduation design, etc.

**Reform Teaching Modes**

During the teaching process, we have been aiming at cultivating the critical thinking and creative thinking of students, as well as stimulating their innovation and entrepreneurship inspiration; have actively explored and reformed the management mechanism and methods during teaching process, changed spoon-feeding education and theoretical teaching in the past, adopted multiple teaching modes, such as heuristic, discussion-type, participatory and inverted classroom modes, represented by integration of on-line

and off-line teaching modes, as well as blended teaching mode. Meanwhile, we have also adopted results-driven approach advocated by the Sydney agreement as well as the MIMPS teaching method, automated instruction of engineers and other advanced project teaching methods advocated by enterprises. We have utilized the teaching platform that is independently developed by ZTE and dedicated teaching materials independently prepared by enterprises so as to enhance students' initiative and interests of learning. In addition, we have invited engineers and technicians from enterprises to hold lectures, encouraged teachers to integrate the newest academic dynamics, technical achievements and innovation experience in industries related to the disciplines into classroom teaching, integrate education and concept related to innovation and entrepreneurship into the entire talent cultivation process.

**Promote the Reform of Course Evaluation System**

Under the guidance of Instructive Committee of Specialty Teaching, we have reformed the evaluation method according to characteristics of each course, enhanced formative evaluation, and transformed the examination evaluation mode into the mode where formative evaluation and practical operation are mainly focused. According to characteristics of the course, we have increased the proportion of usual performance instead of its proportion as 20% in the past. Moreover, we have encouraged teachers to adopt diversified evaluation modes, such as interview, practical operation, course paper, course design and course for work appreciation, etc.; defined corresponding incentive mechanism, performed trial implementation of non-standard answers, emphasized on observing students' learning process and examining their capacities of using the knowledge they mastered to analyze and solve problems, promoted the transformation of evaluation of learning results into formative evaluation, knowledge evaluation into capability assessment, as well as single assessment mode into diversified ones.

## 3.2 Optimize Three Mechanisms for Innovation and Entrepreneurship

**Establish Stepwise Operation Mechanism for School-Level, Provincial and National Professional Skill Competition**

We have revised and optimized the management methods on innovation and entrepreneurship competitions of some universities on the basis of original management methods on innovation and entrepreneurship, supported and encouraged all students to actively organize and participate into various professional competitions, and established stepwise operation mechanism for school-level, provincial and national professional skill competition. From 2015 to 2017, selection contests for innovation and entrepreneurship projects were organized under the guidance of relevant departments for participation of higher level competitions, from which the students had benefited a lot. Meanwhile, the participation and awards have been incorporated into the examination assessment and professional assessment of each education unit.

**Optimize Education Mechanism Based on University-Enterprise Cooperation**

The "Three Ones" engineering program has always been promoted, which requires each education unit to develop inter-university cooperation with one famous domestic university and one famous foreign university, develop university-enterprise cooperation

with one famous domestic or foreign enterprise, integrate into a regional pillar industry, insist in coming out and bringing in, actively expand the integration of production and education and the channel of cooperative education, optimize campus and social environment for cooperative education, innovate the talent cultivation mode with integration of production and education.

As a pilot unit of the second batch of modern apprenticeship system under the Ministry of Education (MOE), the architectural-electrical science, network management, hotel management are key construction majors. Among these, currently the School of Mechanical and Electrical Engineering Technology has cooperated with two famous domestic and foreign enterprises, in order to develop the talent cultivation mode with co-cultivation of professional talents and integration of production, teaching, research, study and application, establish the "Pilot Major of MOE Modern Apprenticeship System". Meanwhile, it has further cooperated with Russian universities.

**Explore and Establish Overall Education Mechanism**

We have established the overall education mechanism that is initiated by the office of academic affairs with the participation of student league, scientific research, employment, ideological and political education, laboratory teaching and management departments; established a platform for innovation and entrepreneurship education for undergraduates, which is based on internship and experiment, takes practical innovation and entrepreneurship projects and professional skill competitions as the core, and regards challenge cup, social practice and entrepreneurship practice as broadening contents; developed a campus culture ecology system with the linkage of all departments, learning while teaching, as well as overall education.

## 4 Conclusion

Generally speaking, great importance is attached to the cultivation of innovative and entrepreneurial talents, comprehensively implemented engineering for innovation and entrepreneurship education, established the innovation and entrepreneurship cultivation system based on university-enterprise cooperation in the Internet+ era, combined education inside and outside the campus, the curricular and extracurricular education, in-class experiments and centralized practices, as well as innovation and entrepreneurship training projects and various professional skills competitions on the basis of further cooperation with enterprises under the modern apprenticeship system. In addition, these faculties have established a platform for innovation and entrepreneurship education for undergraduates, which is based on internship and experiment, takes practical innovation and entrepreneurship projects and professional skill competitions as the core, and regards challenge cup, social practice, entrepreneurship practice and substituted post internship as broadening contents so as to cultivate the innovation and entrepreneurship thoughts and ability of students through the entire talent cultivation process. This is also the key point of the construction of good institutions in modern higher vocational education.

## References

1. Gu, H., Gong, H., Li, S.: Exploration of talent cultivation mode under the background of college students' innovation and entrepreneurship education. Ind. Technol. Forum **20**(14), 159–160 (2015)
2. Hu, I., Li, R.: Research on the training model of innovative and entrepreneurial talents based on the practice of "school enterprise cooperation". Chin. Adult Educ. **21**, 69–70 (2013)
3. Wu, X., Wang, M., Qiang, T.G.: The construction of 1+1+N tutorial system innovation and entrepreneurship talents training mode – taking Traffic College of Northeast Forestry University as an example. Heilongjiang High. Educ. Res. (7), 151–552 (2017)
4. Tan, X., Zhang, J., Guan, X.: Research and exploration of college students' innovation and entrepreneurship education system. Innov. Entrepreneurship Educ. **5**(6), 25–27 (2015)
5. Liu, S., Xu, Z.: Strengthen school enterprise cooperation and promote the cultivation of college students' innovation and entrepreneurship ability. Take private application oriented universities as an example. Sch. Manag. (11), 13–16 (2015)
6. Gao, H., Qiu, Z., Wu, D., Gao, L.: Research and reflection on teaching of C programming language design. In: Wang, H. et al. (eds.) Intelligent Computation in Big Data Era. ICYCSEE 2015. Communications in Computer and Information Science, vol. 503. pp. 370–377. Springer, Heidelberg (2015). https://doi.org/10.1007/978-3-662-46248-5_45