

Practice Exploration on the Integration of School and Enterprise and the Construction of Application-oriented Professional Courses Under the "Dual Education" Mechanism

Taking Qiqihar Institute of Engineering as an Example

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Abstract—At present, it is still a critical period to accelerate the curriculum reform and development of application-oriented undergraduate colleges, and more attention will be paid to the scope and effect of curriculum reform. The study on the realization of students' learning effect and the improvement of students' professional ability can further prove the theoretical and practical value of curriculum reform. This is the new requirement for curriculum construction in the new historical development period of the "dual education" mechanism. The core of the "dual education" mechanism is to cultivate and shape people through the combination of theory and practice. It is strived to break the "physics" form of "theory and practice" and the "chemistry" form of "education with practice", and break the "last kilometer" difficulty of the construction of application-oriented professional courses. This paper will further improve the reform system of applied curriculum of professional courses and add the reform of professional curriculum system into it, which can enrich the theoretical research and thinking of applied curriculum reform and promote the improvement of theory. Application-oriented colleges and universities should combine course development and workplace application in a targeted way. Among them, teachers and students further deepen the inside and outside cross-border classroom cooperation in the workplace and campus, which not only improves the professional knowledge and skills of both sides, but also mutual advice and common growth; taking students' learning effect and its realization as the quantitative index of curriculum reform, it is convenient to blend and reconstruct each link of process. Through the selected professional courses as a starting point for research, on the one hand, it is easy to grasp the incision accurately, on the other hand, it is easy to form and promote experience. Due to its unique professional courses, although there are different subjects in the field of professional differences, but in the implementation of the operation system and effect evaluation, implementation, there are common indicators and standard system, and is conducive to form for examination and assessment of professional courses in learning effect and its implementation in common experience, for the study of the applied professional course of curriculum reform to provide theoretical support.

Keywords—*dual education; school-enterprise integration; co-construction; practical exploration of application-oriented professional courses*

I. INTRODUCTION

The core of talent cultivation lies in the reform and construction of the curriculum. With the continuous development of application-oriented undergraduate colleges and the deepening reform of the professional curriculum system of application-oriented undergraduate colleges, the reform of the professional curriculum with strong theoretical nature has been put forward.

In this regard, based on the spirit of the important documents of relevant education and teaching reform, this paper expounds the practice of implementing engineering education reform for the professional courses of application-oriented undergraduate colleges under the guidance of the "dual education" mechanism, and puts forward some Suggestions. On the one hand, through theoretical innovation, subject innovation, platform innovation to achieve the innovative mechanism of talent training; On the one hand, specific curriculum reform work will be implemented in the form of "project + curriculum + entrepreneurship platform". "Dual education" is not two layers of theory and practice interaction, but on the basis of integration to build courses and educate people together.

Application-oriented undergraduate colleges and universities are the key practice places for the transformation of colleges and universities and the construction of talent cultivation. As the main position of application-oriented talent cultivation, they shoulder the important mission of closely connecting the course construction, talent cultivation with social needs and workplace development. At present, it is necessary to realize the construction of application-oriented curriculum. With the deepening of curriculum reform, as well as the high level of social and enterprise demand for talents, the training time for application-oriented

talents set aside for colleges and universities has been very urgent.

Through a large number of actual teaching feedbacks from front-line teachers, this paper extracts relevant teaching practices, and takes the realization of learning effect of specialized courses as the key content to be solved by means of first-hand investigation. With the in-depth development of higher education, the practice, location, environment and other aspects of teaching activities between teaching and learning have undergone unprecedented changes. Meanwhile, with the new development of science and technology, the new courses represented by MOOC and other new courses in a large range also bring about new opportunities and challenges to further develop higher education. Therefore, in addition to the "normative actions" of conventional projects, the effectiveness of courses and students' learning should be evaluated with the realization of actual effects and the improvement of special abilities, and measured quantitatively with relatively objective indicators and standard system. Research of this paper is to realize the teachers and students in basic knowledge, professional skills, professional quality, the process of examination, can for the teachers and students "end result" respect for objective evaluation, to promote the teachers and students before class, class, after class, the classroom, outside the classroom, in many aspects of internal and external connection, not achieve because a single professional course ended on the end of the professional team relationship between teachers and students.

II. APPLICATION PROSPECT

On the one hand, the application prospect of micro aspect is as follows:

- the teaching experience extracted from the first line can provide reference for the reform of professional curriculum application system in relevant colleges and universities;
- for the purpose of application-oriented reform of professional courses, research is carried out through effect realization and evaluation, as well as precise cultivation of professional ability, which is of certain exemplary significance for the upcoming transformation or the majority of application-oriented colleges and universities.
- the operation practice effect of the entrepreneurial entity of Qiqihar Institute of Engineering has been specifically verified. Therefore, it is obviously authentic, referential and practical.

As for the application prospect of macro aspect, this paper relies on Qiqihar Institute of Engineering, which is a local application-oriented university. Qiqihar Institute of Engineering has made great achievements in application-oriented curriculum reform, development and construction. Such a school in Qiqihar city, Heilongjiang province and even the same kind of colleges and universities in the country has certain demonstration significance, therefore, combined with the actual situation of such colleges and

universities, as well as the actual effect of teachers and students in the teaching reform to study the subject, has outstanding typicality and promotion.

III. THEORETICAL SUPPORT

A. Principles for the Design of Application-oriented Professional Courses

The "three principles" of curriculum design: the content of the so-called "three principles" of curriculum design is: teaching task work, work task curriculum, work process systematization. On the one hand, through the principle of task-oriented teaching, the original subject knowledge system is transformed into a problem-solving action system, and the fixed knowledge points are transformed into methods and tools that are easy to understand and master. On the other hand, by introducing the technical problems and bottlenecks acquired in practice into the specific teaching, the teaching work is not only the teaching of traditional knowledge, but also the analysis and processing of the real situation, and at the same time, it also gives the theoretical height of the actual work task. Third, through these two methods is the working process of the systematic method, the method can elevate theory and practice constantly fusion, knowledge learning and problem solving effectively integrate, change the workplace to the classroom, classroom to the workplace, teacher to coach, getting students to students, can realize the seamless joint between workplace and class as much as possible, both students and teachers' professional development division quality promotion.

B. The Theoretical Coupling of Dual Education

1) *Expectancy theory*: E. Tolman, an American psychologist, pointed out that people expect to achieve the purpose of action through some ways or means by virtue of experience, which is the starting point of expectancy theory. Expectancy theory is intended to solve two problems of motivation: what to expect, what is the probability of achieving the purpose, and what is the value of the purpose. The psychologist E. Locke believed that goals are the determining force of expectancy motivation and that the highest achievement comes from high standards. But the goal must be self-conscious and specific. This theory explains the motivation of students to make continuous progress under the influence of internal and external environment, so as to set specific and practical goals and make continuous progress.

2) *SECI model theory*: This theoretical model was put forward by Japanese scholar Ikujiro Nonaka in his book *Innovation and Victory*, emphasizing that any knowledge can be divided into implicit knowledge and explicit knowledge, and the two can interact and realize each other through subtle (S) -external explicit (E) -summary combination (C) -internal sublimation (I). This provides even strategic support for the realization of the effect of application-oriented professional courses and the improvement of professional ability, and can

also guide the teachers and students' teams to focus on the contents in each stage of the course construction.

3) *Master teaching theories*: In the late 1960 s, the United States education at bloom put forward: improvement of the teaching process and methods, exert students' learning initiative and learning ability, improve the teaching quality comprehensively, on the basis of knowledge attaches great importance to the development of students ability to use knowledge to solve the problem, put forward a complete set of "mastery learning" theory. This is the core of his teaching theory. According to this theory, the development potential of each student should be fully explored and promoted to the maximum extent, so that all students can try their best to study and finally reach their destination. It is very important to motivate students' potential to the greatest extent and make them become real teaching subjects.

4) *Career development theory*: The theory divides people's career stages by: growth stage, exploration stage, establishment stage, the division of maintenance stage and decline stage indicates that the development cycle of professional people and their own work ability is staged. The main application of this theory is to guide students' learning initiative and improve their cognition of practice through the division of career development stages. Using the theory of the main show that simple lecturing in the process of curriculum reform and the practice of the two layers of skin type infusion cannot adapt to the reform of the current work, need to rational development and design of project tasks at the same time and the organic integration of related knowledge, form a new framework of teaching system, so as to "moistens everything silently" to transfer knowledge, deepen the skills, improve literacy.

5) *Cooperative learning mode*: Cooperative learning is a creative and effective teaching theory and strategy that emerged in the United States in the early 1970s and made substantial progress from the mid-1970s to the mid-1980s. Cooperative learning is a structured and systematic learning strategy, which consists of 2-6 students with different abilities who form a group to engage in learning activities in a cooperative and cooperative manner, jointly achieve the group learning goals, improve the overall performance and win group rewards on the premise of promoting everyone's learning level. In this paper, using the theory of the research in curriculum reform, the student teams in terms of study and practice, the main activity form effect, and different ways of learning have different learning effect, and the method of cooperation learning certain level admiral "solo" lower risk of individual learning, and is helpful to improve students' intrinsic motivation.

IV. INNOVATION AND EXPLORATION

At present, with the continuous development of the teaching construction of application-oriented undergraduate courses, they are professional and professional for students

Level requirements increasing, and combine with the deepening of enterprise, through the school teaching and research are closely connected with enterprise needs the actual sprinting, making relying on professional characteristics, realize the fine development of specialization, professionalization, at the same time with the students' professional quality, professional ability, namely improve students can hire sex requirement before the applied undergraduate colleges and universities teachers. It has obvious theoretical value to rely on the specific majors of typical applied universities.

1) *Theoretical innovation*: This study mainly used a new teaching method and theory, such as the course design of "three" principle, the teaching of "five" standard, etc., under the guidance of advanced teaching concept, can be more efficiently applied talents innovation study specific ways of cultivating the ability of entrepreneurship, any talent ability raise cannot leave the specific course system design and implementation, from the point of view in this paper, the study had the characteristics of theoretical innovation.

2) *Subject innovation*: The research effect of this paper can be verified by the actual operation of the management consulting entrepreneurial team of Qiqihar Institute of Engineering. In the whole process of research, guides the student to depth of participation, the formation of business entities, joint development and design of the course to complete the task, the teachers and students are entrepreneurs, all has the dual role, feedback from the practice of new knowledge and skills, in turn, to deepen the theoretical study, therefore, said from this Angle, this paper has the characteristic of innovation.

3) *Platform innovation*: The basic form of platform innovation is innovation of mode and scope of influence. On the one hand, this paper is written on the basis of the parent institutions of application-oriented universities, which are important platforms for the country to train outstanding engineers and explore the effective combination of theory and practice, workplace and teaching. Therefore, there are more in-depth research conditions for the parent institutions of application-oriented universities. On the other hand, the research of this paper relies on the operation of the entity team, and carries out the cultivation and curriculum development of the innovation and entrepreneurship ability of application-oriented talents. The construction of such a platform can shorten the distance between theory and practice to a large extent, improve the professional quality and professional level of teachers and students, and is an education and teaching platform that can kill many birds with one stone.

V. INNOVATIVE CONCLUSION

For applied undergraduate colleges and universities of professional class teaching, to go deep into the real professional environment and implementation of real practice task is crucial, accurately grasp the industry needs both teachers and the mission of the enterprise, social needs,

and effectively with the course together and transformation, forming students can employ the actual material; it also needs to deepen the concrete real projects and become the original reserve resources for teachers and students to start their own business.

A. Introducing Teaching into Practice, Teachers and Students Can Start Businesses to Promote Their Practical Ability

In the conventional teaching activities, teachers and students have a clear division of tasks, with the deepening of education and teaching reform, teachers and students should become more partners. Due to the status of specialized courses, teachers' wisdom is tested by how to set teaching tasks, reconstruct basic teaching contents and design typical project situations.

To better realize the practical application value of professional courses, teachers and students through the formation of professional courses in community, blend in real case to jointly develop the teachers and students is of course, students will practice in the practice of real contact with social practice, skills through the study, design form is submitted to the teacher, the teacher through analysis and organizing students to submit the copy of, again repeated research, according to the actual demand of operating points divide the theory course of school and teach.

On the one hand, students get in touch with the reality in a real way, and train their ability to find, analyze and solve problems in the form of submitting documents, cultivate their management quality, and exercise their real ability to combine theory with practice. In the course of carrying out the reform of "dual education", it is necessary to give full play to students' subject consciousness and solve the problem of students' learning enthusiasm. Competitive entrepreneurial teams are mainly adopted, that is, students form a preliminary entrepreneurial intention before the implementation of the course, formulate development strategies according to the selected project, design their own organizational structure and organizational culture, form a preliminary management standard, and lay a foundation for further implementation of professional courses.

In order to better form the entrepreneurial organizations of teachers and students, competitive entrepreneurial teams must mobilize students' enthusiasm and guide them to "do it by themselves — generate interest — realize innovation". In the reform of professional courses, teachers encouraged students to practice boldly through specific engineering task guidance and detailed engineering task description, which achieved good results. Students ranked top in skills competition and entrepreneurial team construction. In this process, students' basic knowledge is consolidated and their practical skills are greatly improved, which is more effective than separate learning. This effect directly affects students' work performance in the application of professional course knowledge in practice, project development and other aspects, and improves students' sense of career honor. As vivid learning individuals, students need to be able to think independently and study independently. For the complete

professional curriculum reform, it is more necessary to guide students to give full play to their own characteristics, to guide students to have a clear career positioning and a clear understanding of their own jobs. Guide the students from the heart to establish a sense of professional honor and mission.

On the other hand, through serving as managers in entrepreneurial organizations, teachers can truly experience real management cases from the front line, so as to more clearly define the real skills that the society, enterprises and industry really need, and improve their "double professional" level. In the process of curriculum reform, teachers in the search for and improve the professional skills in design project tasks, because of their business practices, to encourage teachers attach importance to learn from the industry, business elite, in their own entrepreneurial organizations consciously has introduced high-level theory, advanced skills of operation personnel and visionary enterprises and institutions of experts. At the same time, in this process, I improved the "double division" ability of the professional course team and cultivated the insight of designing, practicing and starting a business. In the course construction of professional courses, on the one hand, teachers have changed the previous single mode of "teaching in class, practicing after class and consolidating homework", turned the classroom into an exercise ground for implementing entrepreneurial tasks, and transformed the relationship between teachers and students into a workplace partnership of interaction, discussion, common progress and growth.

In entrepreneurial activity and two-way combination of teaching, professional curriculum course set up humanistic curriculum and teaching theory as the core of the theoretical system, not only to respect the students' ability of independent learning in the classroom more respect the student team consciousness of innovation, will obtain the type teaching mode into a simple concept "task front, students' self-study" and more using cooperative learning classroom learning, group discussion, at the same time, the activity, the comprehensive characteristics of the classroom play to the largest, has prompted into both the main line to carry out classroom teaching module of project training.

B. Paying Attention to the Stage Assessment of Practical Innovation Ability

When implementing the entrepreneurial curriculum reform, the professional courses of application-oriented undergraduate colleges should not simply apply the evaluation method of pure skill achievement as the final evaluation result, but emphasize the stage assessment of process and the performance of improving the management system of local social, economic and cultural construction, enterprises and public institutions.

Of course, in the process of combining entrepreneurial practice with process assessment, it is also necessary to take into account the ability to solve specific practical problems. It is not advised to simply freeze students' practice under the framework of simple contact or basic familiarity. Be this would require the teacher and student workshop, office, and

form a new partnership in the workplace, between teachers and students in professional skills, work skills, theoretical knowledge exchange, and etc., exhibit continuously regulate the behavior of the workplace, improving professional quality, continuously consolidate their professional skills, truly will copy patent design, research reports, and other administrative achievements into real actual strength to improve productivity, production relations.

C. Exploring New Channels for Cultivating Practical Innovation Ability Under "Dual Education"

Through the construction of specialized courses, teacher can educate students jointly in theory and practice, and cultivate students' practical innovation ability through simultaneous and periodic evaluation and feedback. This requires attention to improve students' skills and consolidating theory knowledge learning, guide students to system passed its more about the real integration of new skills, to further improve the view of teachers and students form entrepreneurial organizations, encourage students is no longer a soldier, the organization has both teachers' guidance, also has the senior's help, various power from the systematic theory, practical experience and feeling, learning method and skill aspects interact with each other, make breakthroughs in organizational learning form, deep into the classroom organizations, enterprises, institutions and other social organizations.

In this way, the benefits of learning achievements are not only expanded, but also the overall spirit and concept of the team to the maximum. Team members not only enjoy the fierce and fair competition, but also experience the cooperative atmosphere of modern workplace interpersonal relations. In the team, the relationship between teaching and learning is no longer a linear single-angle chain, but a multi-angle chain with interactive influence, common prosperity and common loss. Such a relationship is more stable, innovative and effective.

In this paper, by studying the applied undergraduate colleges and universities "dual" applied curriculum reform development, professional courses in training students skills, increase the student beginning ability, and has obvious advantages in the ability to serve the society, must follow the development of the unique characteristics and applied undergraduate colleges on the basis of reasonable mechanism play a "dual" of professional course, make it become an integral part of the applied undergraduate colleges and universities development.

Practice has proved that through the development of cooperation between teachers and students class, students are encouraged to join the entrepreneurial team, entrepreneurial development, cultivate students entrepreneurial innovation consciousness, inspire the student to participate in the course, questioned actively and the potential, to solve the problem in the tool system of applied undergraduate colleges is completely can make students get system in terms of professional skills, professional knowledge of ascension.

D. Exploring Entrepreneurial Practical Courses and Tailoring Golden Courses for the Workplace

Professional courses of applied undergraduate colleges is based on the emphasis on practice applied reform in colleges and universities, this type of colleges and universities is the current type conforms to the development trend of China's higher education institutions, China's higher education is to improve disciplinization, theoretical, enhance one of the important ways of practice innovation, and important base of cultivating high-skilled applied and practical talents. Therefore, the key to support the teaching reform of applied undergraduate colleges is to strengthen the practicality and professionalism of the curriculum construction of each department.

As application-oriented undergraduate colleges focus on the practicality of curriculum construction and actively build a double-qualified teacher team to train students with professional qualifications, it is crucial to realize the improvement and transformation of students' practical ability in employability by relying on the reform of practical education. To maintain the professional classes course of academic integrity, innovative and strengthen its practice, this course will be part of the practical operational weaker course hours were cut, cut theory classes and increase the field practice, field study, will guide the construction of curriculum outline changed to combined with the specific work process, with engineering tasks as the carrier of the curriculum standard, radiation has played a certain role.

E. Mobilizing the Whole School to Form a Broad Entrepreneurial Course Reform Atmosphere

Colleges and universities are the main position of innovation and entrepreneurship education and the key place to cultivate students' usability. Therefore, the school-wide curriculum reform can provide a platform for curriculum construction and practical education. The school can provide corresponding entrepreneurship course reform policies and systems for teachers and students, promote the formation of entrepreneurship teams and associations jointly built by teachers and students, and better provide convenience for grassroots education and teaching organizations to carry out education reform activities.

Taking advantage of the entrepreneurial platform to further innovate the talent training system, the paper clearly put forward the training strategy of "dual education" for students of various majors and specific guidance measures for the transformation of practical innovation ability. Taking Qiqihar Institute of Engineering as an example, teachers and students can be encouraged to form entrepreneurial teaching teams, scientific research teams, entrepreneurial teams and other legal person organizations. By closely contacting the relationship between teachers and students in teaching practice, it can provide guarantee for training applicable and professional entrepreneurs.

The new guidance system for entrepreneurship platforms is continuously deepened. Qiqihar Institute of Engineering as the local undergraduate colleges and universities, has been committed to conveying to the society, industry, enterprise

and practical talents with high skills, therefore, on the cultivation of students, to industry, enterprise senior personage, the ordinary university scholars as members of the students cultivate the external expert database, led the development of the school teachers and students become more teachers reserve, this system makes students better understand both the enterprise and the real needs of the industry, and can effectively combine professional knowledge for further study, is a good way to fully staffed.

F. Social Cultivation and Local Economic Support

The application-oriented curriculum reform of "dual education" in application-oriented undergraduate colleges is not only the communication between the university and the outside world, but also the integration of the university, enterprises, social organizations and other social forces to share social resources and realize the harmonious development of local higher education. Qiqihar Institute of Engineering, which is a local undergraduate college, has made outstanding contributions in promoting local economic development and exporting highly skilled and qualified talents. It has also spread engineering education and other advanced school-running ideas to all parts of China, contributing to the implementation of engineering education reform in local application-oriented undergraduate colleges. In order to better promote the reform of engineering education in local application-oriented universities, it is necessary to effectively gather all forces in the society and stimulate the optimal matching relationship, so as to promote the application-oriented universities to contribute to the unique power of higher education in terms of the utilization of educational resources, the development of teaching results and social scientific research services.

VI. CONCLUSION

For professional courses, clear the necessity of the reform is done only to face the current cultivating power requirements of the applied undergraduate colleges, by their nature, how to effectively make corresponding measures, follow the professional classes themselves should have detailed theory system, and combining with the society, the enterprise needs, into the practice of specific tasks, prompting fusion theory and the practice in a variety of classroom fermentation is the key.

For students, as participants of curriculum reform in higher education reform, they are also validators. A college student that meets the needs of the current society must be generated through the gradual and multi-layer influence of colleges, majors and courses. Furthermore, as an important participant of teaching reform, students want to know urgently what kind of professional education they will receive, what kind of post group they will practice in, and what professional knowledge and qualities they can recognize in various practical learning occasions inside and outside the school. For teachers, the melting pot in applied undergraduate colleges, needs both teachers have high professional quality, and with good theoretical teaching background, therefore, through the curriculum reform to achieve the most direct education purpose is to each one a

line teachers' requirements, and each line should be the target of teachers themselves.

Whether the talents cultivated by colleges and universities are qualified needs to be put into the social workplace environment to test; The rapid pace of social and economic development needs applied talents who can adapt to such changes. The huge talent gap simply used the previous "labor shortage" type of emergency fill obviously cannot achieve the purpose of long-term development. With the development of the society and the high-speed operation of the economy, the society no longer blindly needs blue-collar technicians who can only operate skills. What the society longs for is more comprehensive management talents who know technology and can manage and can respond to changes, that is, the employability of talents. Try your best to give full play to the exploitability and exploitability of human resources under the current situation.

In application-oriented universities, the reform and construction of engineering education of specialized courses must also be "original". To ensure the systematic nature of the discipline itself and to realize certain instrumentality, it is inevitably not advised to take the road of summative inspection with the entity model as the result. As for how to realize the process monitoring in the construction process, it is necessary to think about the establishment of a more systematic long-term management mechanism. Under the guidance of "dual education" mechanism, professional courses must pay attention to the cultivation of people's morality and accomplishment. The cultivation of students is more reflected in the cultivation of thinking logic of people and things.

The mechanism of "dual education" is based on the real integration of truth and reality, so that students' professional skills and theoretical knowledge can really help students to achieve new transformation. Therefore, the construction of specialized courses that can meet the standard of "dual education" must mobilize multiple resources and pay attention to multiple interests in project selection and knowledge reconstruction.

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