Cultivation on the Practice Ability for Excellent Engineer Innovative Talents under the Transformation and Upgrading of Printing Industry

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\textbf{Abstract.} Since “13th Five-Year”, the printing industry has been restructuring and upgrading, and has showed well future development prospects, so it has still maintained a strong demand on the high-end technical personnel. This paper briefly analyzed the cultivation ways of “excellent engineers” innovative talents, also introduced the achievements of the talents cultivation mode on the teaching reform, teaching resources construction and students ideological situation, students’ ability of engineering practice, improving the quality assurance systems for practical teaching. Finally, it presented a future plan, which involved the design of 2018 training programs, the raise of the practice teaching, the improvement of the mechanism of selection and withdrawal for Bisheng excellence class, the preparation works for the evaluation and inspection on excellent engineer education.

\section*{Introduction}

Beijing Institute of Graphic Communication is one of the second batch construction units on excellent engineer education cultivation program of The Ministry of education (printing engineering is one of the trial majors), and took part in the establishment of the Beijing city university union on excellent engineer education cultivation program in January 2012. In November 2012, the school issued the excellent engineer education and training plan, and excellence program trial class - "Bi Sheng excellence class" came the opening ceremony, which marked the high-level innovative talents training work getting to a newer and higher development stage. At present, the students of 2011\textsuperscript{th}, 2012\textsuperscript{th} and 2013\textsuperscript{th} Bisheng Excellence Class have graduated, and then the 2014\textsuperscript{th} grade students have completed the intramural professional courses and the training tasks including Graphic Information Processing Project and Color Management Project, and it also has finished production practice; The 2015\textsuperscript{th} grade students have achieved the Graphic Information Processing Project (making E-Book) and a series of visiting some companies; The students of 2016\textsuperscript{th} Bisheng Excellence Class have been in the stage of learning professional courses tensely [1]. In the past five years, our college has gradually reformed and explored the new mode of engineering education and talent cultivation according to creating a better learning environment and increasing the degree of practice teaching, so some remarkable performances have achieved.

\section*{The Effective Way of Cultivating Practice Ability of “Excellent Engineer” Innovative Talents}

School refined the new “Three Integration” ideas for talents cultivation as the printing culture elements integrating quality education, the elements of innovation and entrepreneurship integrating into professional education, the business practice elements integrating into engineering education, and also refined the new “Two Services” target for talents cultivation as serving the demand for printing industry transformation and upgrading, serving the demand for the collaborative development of Beijing, Tianjin and Hebei. Our drew up the prospective printing professional
direction and training system for excellent engineer, and created a "Five in One" complete platform for innovative education as “cultural lead, comprehensive training, scientific research, practice innovation and enterprise practice”, and formed of teaching resources sharing and operation mechanism for the inside and outside of curriculum, major or region. Through the following measures, school has established an innovative talents training mode featuring "knowledge imparting, ability training and quality improving" [2].

**Formulating the Major Orientation, Updating the Curricular System, Optimizing the Knowledge Structure, and then Enhancing the Major Attraction Based on Characteristic Major Construction and “Two Trial Projects”**. Printing represents dual features of culture and manufacture, which is one of the nine components in cultural creative industry and is also crucial to technical support. The printing engineering in Beijing Institute of Graphic Communication is the national characteristic specialty. Through explaining the policy, analyzing printing industry, investigating on-the-spot, planning personal career, adding printing culture elements and then combining with successful case, school has completed the major education and strengthened the identification to printing industry [3]. Nowadays, with the development of “Internet Plus”, “made in China” in 2025 and tide of greening, a printing factory of wisdom and green printing are going to appear. In the meantime, grasp the opportunity of “Excellent Engineer Plan Trial” and “Professional Comprehensive Reformation Trial” in Beijing to found the “Bisheng Excellence Class” and further promote “the quality of undergraduate education and the project of educational reform”. Since 2013, the project team has put emphasis on organizing three projects of Beijing educational reform and three major projects in school-level. By done those, the project team have further explored and effective assessed for frame system, main content, implementing method and application effect of the “excellent engineers” innovative talents in the field of printing. And the new idea and new mode for cultivating applied advanced technology talents are concluding gradually.

In addition, the university set up three professional orientations as digital printing and cross-media dissemination, printing manufacture and integrated printing, and put up Chinese Culture History, Chinese Printing, Publishing Introduction, Art Introduction, 3D Printing Technology and Application, the Theory and Technology of Cross-Media Dissemination, Functional Printing and Modeling Materials, Digital Interactive Media Technology, Management overall planning in curriculum system. The scale of updating professional curriculum was over 30%, which optimized students’ professional knowledge structure, and it is beneficial to cultivate high-level comprehensive professional talents and achieve the “Two Services”.

**Creating the First-class Education Platforms and Resources, Promoting the Deep School-enterprise Cooperation, and Improving Students’ Innovation Consciousness and Practical Ability with the Core of “Three Integration” Talent Cultivation Idea**. In the “Three Integration” talent cultivation idea as the starting point, school built the Chinese Printing Museum, Printing Engineering Comprehensive Training Center, Printing Electronic Engineering Training Center, Printing and Packaging Comprehensive Innovative Practice Base, Beijing Artron External Talent Cultivation and other municipal or national level of practice and innovation platform into a “Five in One” innovative practice system [4]. The project team urged the enterprise to involve the school’s training courses deeply, played a role in school-enterprise interaction and enhanced the character of engineering practice in talent cultivation mode. For example, school set the high practical courses of Digital Interactive Media Technology, Color Management and Printing Process into practical courses. Both school and enterprise made jointly the practical plan, and the enterprises dominated the teaching and testing process. The project team actively hosted or organized students to participate in the top of professional skills contest or the domestic and foreign academic competitions and innovation activities, by emphasizing the connection between learning and searching, promoting studying and working. Through the combination of competition and training, school trained students’ innovation consciousness and practice ability. At the same time, the project team concentrated on guiding students with special skills to join the professional skill assessment which used as an optional to train innovate talents with comprehensive quality, achieving the effect that teaching the students on ones’ need, cultivating the students separately as individuals [5].
Through systematic practice training and innovative ability cultivation, students could change their roles quickly to achieve the requirement of the occupation, and develop their professional advantages gradually so as to improve their employment.

**Taking “Two Services” as the Target, Carrying out the Education Reform, Putting the Teaching Management and Operation Mechanism of Multi-level Resource Sharing into Effect, Opening the Vision of Students, and Improving Comprehensively Students’ Comprehensive Quality.** The project team developed steadily Beijing higher education reform program and school level key reform project. It has been focused on the theme of the excellent engineer innovation and entrepreneurship training and engineering practice. In addition, the project team also took part in three Beijing higher education reform project and one school level key reform project. The one of the Beijing higher education reform project "exploration and practice of innovative talents training mode encouraged the going and trying beforehand through the Beijing Institute of Graphic Communication” high level talents cross fostering plan, adhered to problem oriented, explored a new idea of cooperative education, which is guided by "outside training program" and "teaching community with dual training plan", and has achieved remarkable results in education and teaching reform [6].

Based on the cross regional exchange of learning and foreign training, double training and practical training in Beijing, the project team actively carried out students exchange learning activities with domestic university (such as Tianjin University Of Science and Technology, Hangzhou Electronic University of Science & Technology, etc.), which enriched experience and extensive knowledge. Besides, school also promoted mutual training and collaborative instruction on graduation design, student innovation programs with foreign universities (such as Taiwan arts university, Bauer State University of USA, etc.), domestic universities and research institutions (such as Beijing Jiaotong University and Chinese Academy of Sciences, etc.), which expanded external superior resources, enriched practice and innovating teaching means, greatly broadened the horizons of students and improved their comprehensive quality. The multi-level resource sharing system enables students to have more choices, and it not only meet the actual needs of the industry, but also focused on the future industrial upgrading and the region coordinated development of Beijing, Tianjin and Hebei.

**The Orientation of Practice Part and Enterprise Participation**

It was the key and characteristic section about the orientation of practice part and enterprise participation. According to the current students’ interest, as well as the restructuring crisis of current printing enterprises and the actual situation of lack on high-quality talent, the 35 students of excellent engineer class were arranged to make practical exercise into certain enterprise for a long time, which wasn't an appropriate method. How to supervise and control the practice part has needed think deeply [7].

From the above considerations, three very distinctive practice courses were set up, and they are digital interactive media production, color management, printing technology. The theory characteristics curriculum participated by enterprises were image information processing and the principle and technology of post-press.

According to the curriculum named printing professional practice opened for the third grade students, the modular study mode was tried out in 2013th excellence class. During one-year professional practice, students must go through the following four modules professional training and assessment such as operating press, spot color matching, applying SHOTS simulation software, folding and binding in post-press the of the students. Because the courses as printing process and post-press technology were opened in the same period, theory and practice were well combined, and it was good for students to understand and grasp theoretical knowledge, further master their applications.

To the curriculum of enterprise special engineering practice for junior students, it improved the previous projects that teacher set clear practice goals and supervised students’ practice behavior in time. At the same time, the process of combining the graduation project with the needs of the enterprise was advanced [8].
All of these measures have provided students some opportunities to access enterprise and market, so further improved the students’ practical ability.

**Improving the Practical Quality Assurance Systems and Promoting Students Success through Various Channels**

After summer production internship for 2011\textsuperscript{th} and 2012\textsuperscript{th} grade excellence class students, their internship achievements depend on the evaluations from instruction teacher and enterprise tutors and the quality of internship report submitted by the students. The internship monitoring and evaluation of the result represented truly the students’ internship performances.

The school has promoted students to participate in the declaration and research on Beijing municipality college students’ research programs, and participate in various competition such as professional design competition, innovation and entrepreneurship competition and vocational skills competition [9]. It can not only make students get exercise and improvement, but also won the honor for the school. Besides, the school set up *Innovation Print* professional printing competition so as to guide students to put forward printing design and processing plan using what they learned, and then they can solve the actual problem and accept inspection and evaluation of the professionals.

The school has encouraged and promoted excellence class students to participate in the international competition as *Shots* printing simulation software. The organizing committee of the contest employed the previous winners to conduct professional training for students, and organized actively the students’ training processes. This international competition could test strictly and appraise the students’ abilities.

**Future Plan**

The next key work would be the implement of new excellence program, which involved the design of 2018 training programs, the raise of the practice teaching and the improvement of the mechanism of selection and withdrawal for Bisheng excellence class. In addition, the preparation works for the evaluation and inspection on excellent engineer education would be carried out gradually.

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