Advances in Educational Technology and Psychology, ISSN 2371-9400
2021 3rd International Modern Education Research Conference
Vol. 24, 2021, pp. 60-64

Practice and Exploration of Classroom Teaching Reform of Engineering Cost Specialty under the "1+X" Certificate System

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ABSTRACT. It is an important reform plan and a major innovation for vocational education to combine educational background certificate with vocational skill level certificate and explore the implementation of "1+X" certificate system. However, it also puts forward new requirements for the talent training mode of higher vocational colleges. Project cost professional around the building information model (BIM) professional skill level certificate, continue to deepen reform of the education teaching, through the "seed project", the fusion degree education and vocational training system, give priority to with practical courses for the second classroom, BIM.

KEYWORDS: "1+x" certificate system, Project cost, Bim association, Seed program, The second classroom

1. Introduction

The Ministry of Education, The National Development and Reform Commission, the Ministry of Finance and the State Administration for Market Regulation jointly issued the "Pilot Program on implementing the System of" Education Certificate + Certain Vocational Skill Level Certificates "in Colleges and universities, and launched the pilot work of the system of" Education Certificate + Certain Vocational Skill Level Certificates "(referred to as" 1+X Certificate ").In accordance with the requirements of high-quality development, the pilot work will adhere to the student-centered approach, deepen the training of complex skills, training mode and evaluation mode reform, improve the quality of talent training, unimpeded technical skills talent growth channels, expand employment and entrepreneurial skills. Employment-oriented, the goal is to cultivate highly skilled talents by "deepening industry-education integration and school-enterprise cooperation". Only when the skills acquired by students in school are highly consistent with the skills needed in the labor market can students successfully enter the relevant enterprises and be recognized to achieve high-quality employment [1].Therefore, in the context of vocational education reform, to improve and update the training system of vocational education, and to continue to deepen the integration of industry and education, and school-enterprise cooperation, are the basic goals of China's vocational education reform and development in the future, as well as a necessary way for the practice of "1+X" certificate system in higher vocational colleges. According to the specialty characteristics, the engineering cost specialty of our college actively explores the talent cultivation mode of "diploma education + vocational training" with cooperative enterprises. With "seed plan" as the core focus, the practice course as the main classroom and BIM Association as the second classroom, the inheritance of professional skills is strengthened. In the exploration and practice, improve the quality of professional personnel training, promote professional high-quality development.2. The Restriction of Traditional Education Mode to the Development of Engineering Cost Specialty

According to the 13th Five-Year Plan for the Development of Engineering Cost Undertakings, at the end of the 12th Five-Year Plan period, the annual revenue of engineering cost consulting industry reached 107.947 billion yuan, with an average annual growth rate of 14.4%. The construction cost consulting business structure is moving towards the middle and high-end consulting industry. The whole process cost consulting service business accounts for 10% more, and new growth points such as the full life cycle, building information Model (BIM) and information service are constantly emerging [2].The favorable market demand environment has been widely recognized by the society for the engineering cost industry, resulting in the increasing enrollment of engineering cost majors year by year, showing a trend of "booming import" [3].

  DOI: 10.23977/IMERC2021014

In terms of employment, it can be seen from the employment report of college students released by Mycos, a third-party educational data consulting and evaluation institution, that students are mainly engaged in the entry-level work or even the low-level work in cost, such as reference clerk or even construction worker. The job-hopping rate of fresh graduates within 6 months out of school because they do not like or are not competent for the work has reached 41%[4]. The overall employment of students majoring in cost is of low quality and unstable. Apart from the factors of the market, the reasons for this phenomenon can be analyzed from the perspective of source education, which may include the following:

1.1 Analyze from the Time of School Education

Most higher vocational colleges adopt the talent training mode of "2.5+0.5" (5 semesters in school +1 semester in social practice) or "2+1" (4 semesters in school +2 semesters in social practice). Compared with the growth period of cost personnel in 3-4 years, the time is obviously insufficient. In addition, if the school curriculum arrangements unreasonable, curriculum resource development does not reach the designated position, for professional class hours only accounts for a quarter of the entire teaching time - a third, can cause some students only learn the professional fur, was unable to complete the job in the enterprise, the passage of time will thought of job-hopping, therefore, causing liquidity is very big.

1.2 Analyze from the Traditional Classroom Arrangement of School Education

Under the traditional education mode, teachers of most courses in cost specialty still focus on textbooks due to the limitation of conditions, and the teaching goal is to complete the contents stipulated in the course syllabus within the limited class hours. However, most of the chapters in the textbook are in the form of modules which are not connected with each other or are not closely connected. After learning these scattered modules, it is difficult for students to fully apply these knowledge in a specific practical engineering project, resulting in a low effective utilization rate of knowledge.

1.3 Analyze from the Vocational Qualification Certificate Students Can Obtain At School

Vocational qualification certificate is a stepping-stone for students to get employment. For a long time, students majoring in engineering cost in higher vocational colleges can only take the professional qualification exam of "Five masters of Construction". However, the examination conditions for the "Big five" are relatively loose, which makes the holders of such certificates not in the minority in the society. Therefore, the "gold" content of the certificates is low, so students are not willing to invest more time to take such examinations. But the first level cost engineer and the second level cost engineer's registration threshold is higher, the higher vocational college student cannot attend the examination in the school. This causes the cost of professional students in the certificate on the "Not high, not low" phenomenon, the vast majority of students can only get a diploma.

1.4 Analysis from the Depth of School-Enterprise Cooperation

The nature of the enterprise determines that the primary responsibility of the enterprise is to make profits, followed by social responsibility. However, in most of the current "school-enterprise cooperation" modes, colleges and universities cannot truly provide economic benefits for cooperative enterprises. Enterprises are unwilling to share their core knowledge system and other key skills with colleges and universities for commercial reasons, thus making "cooperation" a mere form.

In order to adapt to the new era of higher vocational college talent training new requirements, to better answer the training of who? How to cultivate people? For whom? Higher vocational colleges should keep up with the trend, actively explore a path suitable for their own development, improve the quality of student training, improve the degree of professional matching in employment, so as to promote the healthy development of the whole engineering cost consulting industry. The "1+X" certificate system provides a good development idea for the reform of talent training mode in higher vocational colleges.

2. Exploration of Classroom Teaching Mode Reform under the "1+X" Certificate System

"1+X" certificate, in which "1" is the educational certificate and "X" is the certificate of several vocational skill levels. The ministry of Education launched the first pilot for building Information Model (BIM), Web front end development, logistics management, elderly care, automotive application and maintenance, intelligent new energy

vehicles and other six vocational skills certificates. Aiming at the shortcomings of talent training in engineering cost, combining with the curriculum system of engineering cost and closely following the national policy, our school explored a teaching reform mode -- “seed plan” that conforms to the development of our school.

This plan refers to two rounds of selection for engineering cost majors after they complete the first stage of professional basic courses. The first round is a professional competition in the form of campus competition, and the second round is an interview led by cooperative enterprises. A group of top students will be selected, and these top students are the “seeds”. Then “Seed” enters the enterprise, takes the specific project as the orientation, accepts the high intensity elite training, in 60-75 days for a period of training, “seed” should be proficient in 2-3 BIM application software. After the training, I will go back to school to finish my sophomore year, and take into account practical training guidance, association organization, association operation and other work. The ultimate goal of the “seed plan” is to let some outstanding students grow up first, to drive and help the backward students through the leading role of a few outstanding students, and to let the “seed” take root and sprout in the majority of students under the organization and guidance of the student associations.

2.1 Specific Practice

2.1.1 Seed Selection

Engineering drawing recognition is a basic course for engineering cost majors. If students cannot correctly and comprehensively read the information on engineering drawings, they cannot accurately calculate the amount of engineering by using BIM software according to the calculation rules of the amount of engineering. Every year, our college will hold the “Jingyi Cup” engineering map recognition competition for the students who will be entering the sophomore year. Through the selection of the competition, we will establish the engineering cost talent pool and then select the “seed”. During the selection process, the following principles should be adhered to:

(1) Firm in thought, decent, positive in attitude and willing to contribute. This is the most basic principle in the selection of seeded players.

(2) Based on the ranking of campus performance, pay attention to keep the number of candidates in each parallel class relatively balanced. Ensure a “seed” quota of 3-6% of the total class size in each class.

(3) “Written test + interview” will be adopted to determine the final personnel list. According to the written test results of the campus competition, the top students will be selected for the interview, which will be completed by the cooperative enterprise. The proportion of entering the interview is about 2:3. If 10 “seeds” are selected, 15 students will enter the interview for selection.

(4) During the process of “seeds” entering the enterprise training, the school will continue to pay attention to their status. If students have problems in learning attitude and other aspects during their study abroad, they will be selected and replaced from the list of candidates according to their comprehensive scores in the campus competition.

2.1.2 The Cultivation of a Small Teacher

After the selection of “seed program”, the trainees will be sent to the cooperative enterprise yibrick Yiwa Technology Co,LTD for training and study. According to the production requirements and market demand, the contractual jv shall develop pre-job training and practical operation skill training. Most of the trainees are from the production line. The trainees have a strong thirst for knowledge and a strong learning atmosphere. In the learning process, the enterprise takes the project as the guidance, integrates the courses of drawing recognition, construction, manual calculation, comprehensive application of BIM software and so on into the teaching, and the final result is the compilation of bidding control price of construction drawings. In the 60-75 day training period, the enterprise USES project-based teaching method to complete the actual calculation and valuation of 3 projects. The enterprise master has rich practical experience, and the teaching content is all from the actual project, and has been repeatedly verified, used in teaching can improve the pertinence.

During the training period, according to the school-enterprise cooperation talent training agreement, in addition to the learning of professional theoretical skills, “Seed” will also participate in some modular training, such as reinforcement binding, scaffold making, template making and other training programs, which greatly improves “Seed” hands-on ability and practical experience. In order to become a qualified “little master”, I will lay a solid foundation for returning to school to guide students' practical training courses and organize association activities.

After the completion of all courses, the enterprise will issue an evaluation report according to the performance of each student, including attendance, learning attitude, learning ability, comprehensive performance evaluation, etc. The training certificate will be issued according to the final score.

2.1.3 Master's Union

The cultivation of small masters has injected new vitality and fresh blood into the talent cultivation of our school. School teachers are no longer the only source of knowledge. Teachers, as masters of the school, must also keep pace with The Times. Every year, our school sends 2-3 teachers to the enterprise to participate in the practical training for a period of not less than two months. Starting from improving teachers' theoretical teaching ability and practical teaching ability, our teachers can truly become “double-qualified” teachers meeting the needs of higher vocational education. On the other hand, according to the requirements of the talent training program for engineering cost majors, the enterprise regularly sends its masters to the school for lectures, so as to deepen the students' understanding of the industry situation and career planning and improve their understanding and love of the major. The combination of school masters and enterprise masters provides a strong guarantee for the training of engineering cost professionals in our college.

3. Conclusion

The most important characteristic of social work development model in Shenzhen is that it follows an operation logic of “Market Competition”, in which the government provides institutional guarantee and funding supports, and social work institutions need to obtain government purchase of services through bid-tendering. In order to ensure the service effect and provide reference for subsequent bidding work, the assessment and supervision system for performance assessment of social work service institutions has been established featured in entrustment by government and organization and implementation by third party assessment institutions, which ensures the fairness and rationality in the operation of the whole model to the greatest extent. The innovative “market competition” mode of social work institutions in Shenzhen mode has certain advantages, which is conducive to promoting the healthy operation of social work institutions and stimulating their initiative and enthusiasm. But at the same time, there are some potential troubles in Shenzhen model. Firstly, the “over marketization of social services”, that is, social work institutions may pay too much attention to the needs and interests of “patrons” and neglect the needs and interests of service objects in order to win the favor of “investors” in the “Market Competition”; secondly, although market competition plays a role of “sifting sand for gold”, it may easily result in unbalanced development of social work institutions and even social work fields.

Through the “seed plan” training, the “seed” master has a strong theoretical knowledge of map reading and calculation, as well as the use of BIM software modeling and calculation skills. In combination with the assessment requirements of building Information Modeling (BIM) Vocational Skill certificate in the “1+ X” certificate, the “seed” young master is allowed to go deep into the classroom and complete the training for other students through the integration of the first class and the second class. The first class consolidates the foundation, the second class improves the quality.

In the first class, the theory teaching and software demonstration of the teacher are the main courses, and the “seed” teacher assists the teacher to complete software q&A. The number of students in each class of our school's engineering cost class is 45-55. For the teachers, in the limited class time, they should not only complete the theory teaching and demonstration of BIM software course, but also answer questions one by one in the process of student operation. The time is tight and the task is heavy. Based on the above situation, the advantages of the small master are obvious. The small master is assigned to each class, and together with the course teacher, the students who have problems are synchronized in answering questions and tutoring, which greatly improves the learning effect. Of course, it is far from enough to be proficient in using BIM software only by 180 minutes of operation time per week in the first class. Therefore, the establishment of the second classroom becomes significant.

Based on the student Association and centering on “seed”, the BIM Association was established in the second class to serve all freshmen and sophomoers. The second class is a continuation and improvement of the first class. The second class provides a platform for students to improve their skills through a large number of BIM software extra-curricular exercises, fun contests, invited expert lectures and other forms, so as to enable students to develop in the direction of professional depth. School project cost studio room free open to all students, in addition to the time arranged by the school schedule and association activities, students can practice of BIM software to the computer room, and the association of BIM arrange room rotation, to ensure that students problems in the operation of the software can get timely solve, really have to old with the new, skills to the role of inheritance.

With “1+ X” BIM vocational skill certificate as the target, the first class and the second class are integrated, and the small master and the big master are combined. This teaching mode provides a good solution to the shortcomings of engineering cost specialty in our college, which are embodied in:

(1) Increased students' time to operate the software and greatly improved their proficiency in software operation. Through the second class, students gain an average of 240-480 minutes of practice time per week. For most students, the sense of achievement is obvious after a long time of software operation. A sense of accomplishment leads to a sense

of professional identity, which lays a foundation for job stability after employment.

(2) In the second class, the relatively scattered knowledge points in the first class were connected together, and the practice amount of 2-3 projects was used to firm the knowledge. Students with good foundation and frequent practice could even complete the measurement and valuation of a small project independently, with an accuracy rate of more than 95% and the learning effect multiplied.

(3) After the implementation of “Seed plan”, in the two examinations of “1+ X” BIM Vocational Skills Primary Certificate organized by the state in 2019, the passing rate of our school is respectively 30% and 45%, both higher than the average passing rate of Yunnan Province-25% and 29%.The total number of applicants was 145, and the number of those who passed the examination was 53, accounting for 21% of the total number of students in the grade. The students who got the certificate set an example for the students who did not take the certificate and formed a good atmosphere of chasing after each other. Moreover, this certificate has a high “gold content” and is relatively scarce in the market at present. It is a good “stepping stone” for students majoring in engineering cost to obtain employment. In the process of “obtaining the certificate”, students have improved their self-learning ability and gradually formed the habit of self-discipline, killing two birds with one stone.

(4) The results of school-enterprise cooperation really go deep into the classroom and serve the teaching. “Seeds” as “achievement” of university-enterprise cooperation, after the train back to school to continue to finish school as a teacher in the process of the main auxiliary and associations, sprout in each class, passing on skills, spirit, animating the whole class and the professional spirit and learning atmosphere, for the next round of “seed program” played a good role models, to promote the professional development of a virtuous cycle.

Acknowledgement

Scientific Research Fund project of Yunnan Education Department (Item number:2020J1328).

References

[1] Lin Zhou. Discussion on the innovation of personnel training mode of higher vocational Education oriented by employment. Education Teaching Forum, No.30, pp.263-264, 2016.

[2] China Construction Engineering Cost Management Association. China Construction Cost Consulting Industry Development Report (2018 edition), China building industry press, 2019.

[3] Haifang Li., Shuang Tian. Development status and Countermeasures of Engineering Cost Specialty: A Case study of City College of Dalian University of Technology. Science and Technology Innovation Herald, No.10, pp.247, 2019.

[4] Shuai Zeng., Xiaolu Li., Danxiong Chen. The Blind Spot of modern vocational education system construction: the construction of the integration of vocational education and training. Journal of Guangdong Normal University of Technology, No.6, pp.3, 2018.