

Analysis on the influencing factors of industrial enterprises' deep participation in engineering talent training process

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Abstract: More and more colleges and universities pay attention to the participation of industrial enterprises in the process of engineering talent training and their influence on talent training. With the promotion of new engineering education concept, industrial enterprises play an increasingly important role in talent training. This paper analyses the current situation of industrial enterprises' participation in the training process firstly. Then it analyzes the difficulties and blocking points systematically through the data. The result proposes that school-enterprise cooperation platform under the guidance of government is the key factor for the healthy and sustainable development of the participation of industrial enterprises in the training process.

1. Engineering education certification standard and its core concept

On June 2, 2016, China Association for Science and Technology became a full member of the Washington Agreement on behalf of China successfully, and China's engineering education certification standard was recognized by the signatory member countries.

The Washington Agreement, part of the International Engineering Union, aims to recognize engineering education qualifications bilaterally or multilaterally, and provides that graduates of any accredited program from any signatory member organization can obtain accreditation from all other signatory member organizations. At present, except For China, which is an official signatory of the Washington Agreement, it means that the results of China's engineering education certification will be recognized by other members, and graduates who have passed the certification program will enjoy the same treatment as graduates from their own countries when applying for engineering qualification in relevant countries^[1]. The Washington Accords set standards for what undergraduates should learn and what graduates must possess, serving as a framework of reference for the substantial equivalence of signatory member states. On this basis, China Engineering Education Accreditation Association makes detailed provisions on China's Engineering Education Accreditation standards. Standards include general standards and specialized supplementary standards. Common standards for professional made detailed requirements of seven aspects: students, training objectives, graduation requirements, continuous improvement, course system, teaching staff, support conditions, with standard interpretation of the above seven project. In addition, several professional areas which can participate in engineering field is given the corresponding professional standard on the basis of the general standard.

The engineering education accreditation standards embody three core concepts: student-centered, goal-oriented, and continuous improvement. The three core concepts run through the standard's seven projects: students, training objectives, graduation requirements, continuous improvement, curriculum system, faculty, and supporting conditions, and require that specialties be reflected and implemented in the process of talent training.

2. The embodiment of the goal orientation of engineering education -- the necessity for industry enterprises to participate in the training process

Goal-oriented, as the name implies, determines graduation requirements by training objectives, designs curriculum system by graduation requirements, ensures completion of graduation requirements by teaching staff and supporting conditions, promotes continuous improvement of graduation requirements according to the development of The Times and continuous improvement of training objectives, as well as continuous improvement of other standard items. The professional training objectives are closely related to the industry, and the requirements of the industry determine the training objectives. Therefore, industry plays a crucial role from the aspect of professional construction and talent training quality. The form and depth of school-enterprise cooperation play an irreplaceable role in the process of engineering education, the achievement of the goal of engineering education and the continuous improvement of engineering education. In 1994, MIT Dean Joel Mosis presided over the development of the college's long-term program called The Big Engineering View and Integrated Engineering Education. The reform direction of engineering education is to make the current engineering education based on discipline navigation pay more attention to the engineering practice, the system and integrity of engineering itself^[2].

On June 13, 2013, China has become the Washington agreement for member states, and Chinese engineering education standards continue to improve. Begin from 2015, the graduation requirements items emphasized the ability to solve complex engineering problems especially in general certification standards, which highlights the competency standards of certified engineering graduate in practice and industry joint. It is essential that the industry be deeply involved in the training process.

At present, the common problem of engineering education is that, production practice with industrial enterprises as the main place is more of a mere formality in the undergraduate stage. In fact, production practice in the form of visiting does not play a role in cultivating students' engineering practice ability, let alone the cultivation of students' innovation and entrepreneurship ability. The important university-enterprise cooperation encountered is embarrassing in the undergraduate stage, better than nothing.

3. The participation of industrial enterprises in the training process is not satisfactory -- colleges and universities' own wishful thinking.

The practice is an important part during higher engineering education. It is able to grasp the economic and social demands for engineering talents accurately with the most advanced production equipment and manufacturing technology, and has a group of experienced engineering and technical personnel to provide the real engineering practice and innovation environment, which are not available in colleges and universities^[3]. However, with the increasing neglect of enterprises, practice has become the "chicken rib" in the teaching link, which is manifested in the lack of innovation in the content, the single form, the inconspicuous effect, and is criticized by many professional teachers.

There has always been no lack of cooperation between universities and enterprises. At present, the cooperation between universities and enterprises is mainly reflected in the transformation of scientific research achievements and product research and development. As a part of school-enterprise cooperation, accepting student internship is ignored by enterprises in different degrees. Obviously, the fundamental reason for different attitudes of enterprises towards different contents of school-enterprise cooperation is whether they benefit from it or not. The transformation of scientific research achievements and the development and development of products may enable enterprises to increase their profits, expand their prospects and improve their product competitiveness now or in the future. Thus, enterprises are willing to invest more material resources, human resources and financial resources in such university-enterprise cooperation. By contrast, accepting students as interns is not attractive enough for enterprises. On the contrary, the additional workload has potential safety hazard and production implications. Considering the issues of economic benefits and production safety, enterprises regard student internships as a burden, a kind of trouble usually, are reluctant to receive students, and the enthusiasm to undertake the task of student internship decreased^[4].

Data from 875 questionnaires distributed and collected to enterprises in Jiangsu province provide a general understanding of the reasons why enterprises do not accept student internships: fear of additional workload (39%); fear of causing unnecessary disputes (40%); fear of divulging core technology secrets (32 percent); worry about affecting the normal progress and order of production and operation (62%); fear of losing out financially (20 percent); concerns about potential safety hazards (55%); society does not have such an atmosphere (8 percent); others (2%).

Because of the reluctance of enterprises to accept the willingness of college students to practice, there are inevitable objective reasons in many aspects, and colleges and universities lack long-term guarantee mechanism in the arrangement of necessary production practice links. The author once interviewed the professional leaders of the first four pilot majors of “Excellence Plan” in the university to understand the internship details of the enterprise. The interview results showed that the selection and determination of internship units mostly depend on the support of alumni, and once the alumni are transferred, it is difficult to guarantee the internship base. Companies can cancel internships due to emergencies.

In the undergraduate stage, both the university and the enterprise show the phenomenon that the university is in a rush, and there is no equal platform for cooperation. The main control party (industry enterprises) involved in the production practice is passive, and the internship effect cannot be guaranteed.

4. Government guidance is the key factor for enterprises to deeply participate in the training process

According to the above analysis, in the undergraduate stage of university-enterprise cooperation, colleges and universities are in a rush, and industrial enterprises are reluctant to accept the negative will of college interns, resulting in the quality of internship. After China becomes a full member of the Washington Agreement, the production practice of engineering students will have a positive and continuous development. For any engineering specialty certification, the site inspection panel members shall include at least one corporate engineering technical expert (or two if the panel consists of five) ^[5]. If the previous industry enterprises do not have a thorough understanding of the training of engineering students, with the help of engineering education certification, the industry enterprises have a full understanding of the production practice and the effect of production practice.

In a recent engineering education professional certification feedback meeting held in the university where the author is located, 3 of the 5 members of the expert group came from enterprises and proposed issues related to production practice respectively. For example, Baofeng Zhang, deputy secretary general of China Petroleum and Chemical Survey and Design Association, and Yuqing Wang, professor-level senior engineer of Sinopec, both believe that the effect of production practice of training plan needs to be further improved, and strengthening the connotation construction of production practice in schools and enterprises should become the reform direction of professional construction. Jianxiang Zhang, deputy general manager of Lu Thai Textile Co.,Ltd, described the principles of employment from the perspective of employers' recruitment of graduates, and advocated the cooperation idea of integration of schools and cities, and cooperation between schools and enterprises. with the progress of science and technology, they believe that knowledge is updated with each passing day. Only by strengthening the depth of cooperation between universities and enterprises, enhancing the participation of enterprises in the training process can the quality of engineering talent training be guaranteed. They admitted that the current depth of school-enterprise cooperation is not enough. The key factors for industrial enterprises to deeply participate in the undergraduate education process need government guidance.

As the survey results show, the main reasons for companies not accepting student internships include: fear of causing unnecessary disputes (40%); worry about affecting the normal progress and order of production and operation (62%); concerns about potential safety hazards (55%), etc. These worries determine the willingness and attitude of enterprises to accept college students' internship. For the low quality of internship ^[6], enterprises think that the government's investment is not enough (50%); inadequate government policies towards enterprises (63%); colleges and universities pay

insufficient attention to internships (27%); students do not work hard in their internships (37%); the work of leading teachers in universities is not in place (18%); insufficient internship conditions (32%); not enough attention from business leaders (23%); the teaching ability of business guidance staff is insufficient (21%).

The survey results of 762 samples collected from science and engineering teachers in colleges and universities aged 30 to 35 in the province show that the important factors affecting the effect of college students' off-campus practice include: insufficient government investment (48%); insufficient government policies towards enterprises (61%); colleges and universities pay insufficient attention to internships (34%); students do not take their internship seriously (38%); poor work of leading teachers (24%); the teaching ability of base instructors is not enough (30%); lack of attention from base leaders (24%); insufficient internship conditions (34%).

The main factors affecting the unsatisfactory effect of college internship are related to the government. The guidance and platform building of the government are the key to the joint training of college students and the deep participation of enterprises in the training process.

5. Promote the measures of university-enterprise joint training of engineering talents

5.1. Implement all-round institutional guarantee

We will strengthen policy guidance mechanisms. The guiding, coordinating, promoting and monitoring roles of provincial and municipal governments in promoting school-enterprise joint training are clarified by formulating regulations with the nature of laws and regulations. It is the obligation and responsibility of enterprises to train talents jointly with colleges and universities. It is clear that colleges and universities should ensure joint training with enterprises in manpower, material resources and financial resources.

Establish a special investment mechanism. We will explore the establishment of a government subsidy mechanism for university-enterprise joint training that is invested and monitored by the government, and include college students' internships in the scope of government financial subsidies. We will explore a two-level subsidy system at the provincial and provincial levels to allocate special funds to enterprises and universities that implement university-enterprise cooperation so that such funds can be used exclusively.

Explore tax incentive mechanism. According to the newly promulgated "Enterprise Income Tax Law" and its implementation rules, on the basis of full research and demonstration, formulate corresponding tax incentives and reduction measures, and further clarify the preferential tax policies and other incentive policies in the process of cooperation with universities and colleges.

Establish a risk control mechanism. The Measures for The Prevention and Handling of Accidents caused by Internship Injuries among College Students have been issued to expand the scope of workers' injuries identified in the Regulations on Work-related injury Insurance to include internship students in the scope of work-related injury insurance. While protecting the interests of injured students, we should pay attention to controlling the risks of enterprises.

5.2. Cultivate a team of double-qualified teachers

Both schools and enterprises should establish incentive and promotion mechanisms, strengthen the construction of internship teachers, train the engineering practice ability of university internship leading teachers, and improve the teaching level of industry and enterprise internship guiding technical personnel.

According to the training plan and the goal of the practice link, the scientific development of production practice plan, through reasonable assessment to achieve the goal, can effectively evaluate the assessment results and can continue to improve the content, method and assessment of the production practice, avoiding the production practice become a mere formality effectively.

Under the organization, coordination and guidance of the government, both sides of the school and the enterprise clarify their respective rights, responsibilities and benefits by means of contracts, contracts, agreements and other legal ways, establish a student internship management system and

evaluation index system conducive to the cooperation between the two sides, and realize the standardization of the construction and management of the internship base and the sustainable play of its role.

6. Conclusion

Under the framework of "Washington Agreement" system, engineering majors need the participation and advice of industrial enterprises in many aspects from the formulation of undergraduate training plans, to the implementation of training plans and to the achievement of training goals. Especially in the development of science and technology and industrial revolution of the new engineering background, the new engineering has the characteristics of leading, tong wide sex, forward-looking, cross, openness, practical^[7]. In the present, industrial demand should be the guide for upgrading and development in the scientific development, cutting-edge knowledge and innovative technology upgrade^[8]. Thus, more of universities and colleges need to strengthen the side of talent supply and demand sides of the industry enterprise collaboration and mutual melting. It is an effective and necessary way to construct a long-term mechanism of deep connotation cooperation of school-enterprise talent cultivation by government leading, issuing encouragement, incentive policies and building a platform of school-enterprise collaborative education.

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