



Research on Talent Cultivation Mechanism of School-Enterprise Collaboration

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Abstract. High-quality innovative talent training of higher school cannot be separated from the industry and enterprise support. With China economy entering the stage of high-quality development, talent training needs to change with the industry pattern. "School-enterprise collaboration" are becoming more and more important. Based on the electrical engineering specialty, This paper analysis the current school-enterprise collaboration mechanism through the survey. For the existing problems, the paper put forward the corresponding recommendations from different dimensions. It aims to promote the cooperation between higher schools and enterprises, and the high-quality connotative development of talents.

Keywords: higher school; school-enterprise collaboration; talent cultivation.

1 Introduction

Electrical engineering is one of the core disciplines in the field of modern science and technology, and it is an indispensable key discipline in today's high-technology field. The education of electrical engineering has always played a very important role in China's universities. As China's economy enters the stage of high-quality development, talent training needs to change with the industry pattern. In order to cultivate qualified electrical engineering professionals and technicians, the state constantly encourages schools to implement the school-enterprise cooperation model, require the strengthening of school-enterprise synergies, to improve incentives for the integration of production and education, and enhance industry's positivity for participating in undergraduate education^[1-2]. In the face of new educational challenges, it is necessary to actively explore the talent cultivation mode of school-enterprise collaboration in electrical engineering^[3-4].

2 The survey Studies

The objective of innovative talents training in electrical engineering is mainly to meet the two requirements of industry and application. Industry refers to the industry-oriented training, the training of talents should have a strong specialization characteristic,

for better adapting the needs of the industry, and servicing industry development; application refers to focus on the industry needs, and employment-oriented, and combination of theory and practice, to train applied talents . To achieve the above talent training goals, it needs the school-enterprise collaborative cultivation of talent model. School-enterprise cooperation and collaborative education is that enterprises and universities cooperate and collaborate with each other, maximize to use teaching resources, experimental practice and other conditions of schools and enterprises, to improve the practical ability and innovation ability of the applied talents^[5]. At present, although the school-enterprise collaborative education has made great progress, but there are still many substantive issues unresolved^[6-7].

Our university's electrical engineering mainly serves in the field of shipbuilding industry and marine development. in order to find out the shortcomings of the current school-enterprise collaboration operation mechanism, we have done a comprehensive and in-depth research on the effect of school-enterprise collaboration between our school and the industries. The main objects of the research are the teachers and managers in university, graduates and the enterprises. The research on graduates mainly is taken by telephone questionnaires and network questionnaires. In 259 valid questionnaires, 85 questionnaires are collected from alumni who graduated for more than 5 years; 103 questionnaires are collected from alumni who graduated for 2 to 5 years; and 71 questionnaires who graduated 1 year ago. Research on enterprise experts, technicians and managers, is executed by visits, paper questionnaires, network questionnaires etc., a total of 75 effective questionnaires were collected from employers, teacher and managers. Among of them ,31 effective questionnaires were collected from teachers and managers of the University, from the feedback of the questionnaire survey, the problems were found to be mainly focused on several aspects, shown in Table 1.

Table 1. Main problems of school-enterprise cooperative operation feedback

	Quite satisfied	Very satisfied	satisfied	Not satisfied
Operation of School-Enterprise Collaboration	10%	26%	52%	12%
Government policy guidance	20%	12%	40%	28%
Protection of business interests	17%	12%	31%	40%
Rationalization of the curriculum	25%	30%	35%	10%
Sophistication of the student assessment system	11%	45%	34%	10%
Student participation	18%	25%	40%	17%

3 Current Situation of Electrical Engineering Talents Training

From the feedback of industrial enterprises, alumni and teachers of our university, it can be seen that the current school-enterprise collaboration in training students is inadequate. Whether school-enterprise synergy, or multi-body synergy, the concept of each subject is complete, just a lot of synergy is not really in place, school-enterprise synergy is actually difficult to implement, deepen, and be effective. These three difficult problem specifically manifested in:

3.1 Formalism

A high proportion of joint training by schools and enterprises is formalized and lacking in real substance^[8]. The engineering innovation and practical application ability of students are still out of touch with the needs of enterprises, while enterprise mentors often lack incentives to really guide students, which to a certain extent reduces the advantage of students' professional competence, resulting in the embarrassing situation of "get left".

3.2 In the School-enterprise Synergy, There are Many Contradictions among the Subjects

During the collaborative implementation between schools and enterprises, conflicts are prevalent and the outcomes are often suboptimal due to the different interests and mutual bargaining of various stakeholders, including universities, enterprises, government, and students. Moreover, due to differences in value orientation, limited time and effort, and unclear distribution of benefits, both university mentors and enterprise mentors lack effective communication in the talent training process, resulting in a disconnection in the training stages.

3.3 Insufficient Balance between Theoretical Research and Application Skills

Common errors are: either an overemphasis on "enterprise-driven projects," resulting in the creation of some low-level and low-skilled "vocational products"; or an overemphasis on "theoretical pursuits," leading to students who lack the ability to solve practical problems and possess poor technical skills^[9]. It make them unable to take on professional technical work quickly in the industry or enterprises.

4 An Analysis of the Main Causes of Current Issues

4.1 From the Perspective of Universities

In the context of insufficient industry-education integration and a fragmented industry-university-research, most university teachers lack engineering practice experience due

to the talent evaluation system of "emphasizing theory over engineering practice ability." Although participation in enterprise occupies an important position in the practical teaching system, there is a lack of deep consideration of the complex economic motivations behind enterprises and students.

4.2 From the Perspective of Enterprises

Truly high-tech enterprises like Huawei that value advanced technology research and development are still a minority in China. Most of the enterprises focus on repetitive and homogeneous research topic, and a significant proportion of them do not involve advanced technology. These phenomena partially lead to students and university teachers viewing enterprise topics with disdain and rejection. Additionally, there is insufficient top-level design by the government regarding the salaries and work time allocation for enterprise mentors. Universities also have issues such as arbitrary selection and simplified assessment for enterprise mentors. This results in a lack of "legitimacy" and "authority" guarantees for the cooperation between universities and enterprises and between mentors. University mentors and enterprise mentors also lack effective communication in the talent cultivation process due to differences in value orientation, time and effort, and distribution of benefits, resulting in some problems in the training stages [10]. Consequently, University mentors and enterprise mentors have insufficient involvement in cultivating students' practical abilities, it often remains superficial in their participation.

5 Strategy for University-Enterprise Collaborative Talent Training

How can the practical aspects of school-enterprise collaboration be effectively, deeply, and practically implemented? Regardless of the number of stakeholders involved, our higher education must be people-oriented and student-centered, as shown in Figure 1.

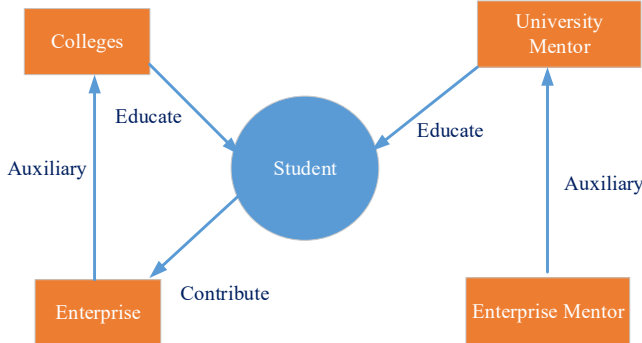


Fig. 1. One Center Multi Collaboration Relationship Diagram

Domestic research mainly focuses on exploring training models, but there are shortcomings such as unclear goal-driven requirements and incomplete incentive systems during the training process. These designed training models often result in a significant gap between the current electrical engineering education in China and the actual application needs of society. The question is how to design training content and methods in advance based on actual enterprise needs, industry trends, the professional fields of the mentor team, and the personal qualities of students. From the moment students enroll to their enterprise practice, differentiated and guided training should be conducted to help students integrate into the practical aspects more quickly and effectively.

5.1 Analyzing the Multilateral Collaborative Behavior Mechanism in Student Participation in Enterprise Practice

In the process of student participation in enterprise practice, the guidance model adopted by the enterprise and the attitude of the students towards the practice are ultimately driven by short-term or long-term interest goals. Their decision-making behaviors influence each other, presenting an obvious game relationship. The school monitors the students' practice process based on training objectives and takes necessary control measures, which will regulate the game behaviors and equilibrium results between enterprises and students. Therefore, the behavior mechanism among the three parties can be studied from the perspective of game theory. Based on actual research, a two-dimensional game model between enterprises and students can be established, considering the impact of school supervision on the game. This can explain some problems encountered by electrical engineering students in enterprise practice from a management theory perspective and provide a theoretical basis for improving the practice model. The analysis can be approached from the following aspects:

- ① Research on the motivation of students participating in enterprise practice.
- ② Investigation of the actual guidance mechanism of enterprise mentors.
- ③ Analysis of the multilateral collaboration motivations among schools, enterprises, and students.
- ④ Construction of a two-dimensional game model between enterprises and students and an external constraint model for university management.
- ⑤ Analysis of game strategies.
- ⑥ Analysis of equilibrium strategies and conclusions.

5.2 Constructing a Practice Motivation Incentive System

The goal of the school is to cultivate students' innovative practical abilities and improve the quality of high-level applied talents, while enterprises aim to meet their short-term technical or new product development needs and long-term economic profit growth. Students' goals are mostly to learn advanced technologies and develop the ability to solve practical problems, while mentors' goals often focus on enhancing their academic status, job titles, and economic benefits. Therefore, in the implementation process of the practice, conflicts and "three-difficulty" problems arise due to the mutual gaming

of the goals and interests of various parties. Just as students need motivation to study, all parties need motivation and incentives to work. The most direct and effective means come from incentive mechanisms such as assessment, evaluation, supervision, and rewards and punishments. Motivational incentives are indispensable for collaborative education. Therefore, to achieve the dual goals of school and enterprise, while also considering individual goals, a practice system is explored through a series of assessment systems and incentive mechanisms. Centered on students, and driven by the dual goals of school and enterprise, the exploration of a multilateral collaborative practice incentive system under the cooperation of dual mentors should be carried out in the following aspects:

- ① Constructing an intrinsic motivation incentive system (improving professional skills) and an extrinsic motivation incentive system (obtaining economic benefits) for student practice.
- ② Establishing an evaluation system and layered evaluation mechanism for school mentors.
- ③ Exploring a data-driven dual-mentor collaborative performance comprehensive evaluation closed-loop system to provide a foundation for enhancing students' practical abilities and maximizing their economic contributions in enterprise practice.

5.3 Establishing a Hierarchical Practice Project Resource Sharing Library under Dual-mentor Collaboration

The quality of practice projects directly affects the quality of student training. A suitable project topic allows students to fully utilize their strengths, meet enterprise needs, and develop comprehensive abilities to analyze and solve problems. Focusing on the technical needs of enterprises and the continuity and depth of school mentors' student training topics, thorough communication and docking among school mentors, students, and enterprise mentors are necessary to ensure the feasibility of the topics. Therefore, the establishment process of the practice project resource sharing library can be approached from the following aspects:

Problems encountered in the actual production, research, and development processes of external enterprise practice bases, with the cooperation of enterprises and enterprise mentors, form a hierarchical enterprise demand dynamic shared question bank. The hierarchy is reflected in categorizing enterprise topics into "general emerging technology reserve issues," "general technology transformation and upgrade issues," and "core technical bottleneck issues" with different vertical difficulties and horizontal extensions.

Dynamically adjusting the practice project resources in the question bank according to the changing needs of enterprises. For vertically challenging projects, multiple students can research one topic; for horizontally extending projects, students from different years can take turns participating in the research. With the assistance of dual mentors, students can choose topics based on common selection methods from the project resource library, considering students' practical abilities, time, and personal potential constraints.

6 Conclusion

This paper analyzes the existing issues in the current school-enterprise collaboration mechanism through a questionnaire survey, and puts forward three countermeasures and suggestions for the cultivation of school-enterprise collaborative talents, aiming to provide references for promoting the communication and cooperation between schools and enterprises and the high-quality development of talents.

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