

# Research on the Diversified Mentoring Models for Open Base Engineering Graduates – A Case Study of Foshan

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**Abstract:** The key to guaranteeing the quality of engineering graduate cultivation lies in establishing a dual mentorship model, involving both, universities and enterprises. By analyzing the existing problems in dual mentorship for engineering graduates, the open base for joint graduate cultivation in Foshan is taken as an example. Under the “2+2” diversified mentoring model constructed for engineering practice cultivation, an open base guarantees the implementation of the diversified mentoring model, while the diversified mentoring model improves the effectiveness of collaborative education between universities and enterprises. Strengthening the qualification examination of collaborative education and reinforcing the academic ability training of enterprise mentors are proposed as strategies for the problems faced in the implementation.

**Keywords:** Open base; Graduates; Mentor; Diversified mentoring

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## 1. Introduction

As a manufacturing power, China calls for a large number of excellent engineering talents for the development of its modern manufacturing industry. Engineering graduates serve as the new workforce of excellent engineers. For a long time, the cultivation of engineering graduates has been criticized for its disconnection between theory and practice as well as research and application, leading to a serious disjunction between the cultivation of engineering graduates and industrial demands. The key to solving this problem is to reform the current teaching link and truly implement the university-enterprise joint cultivation, which in turn necessitates the construction of a new university-enterprise joint cultivation base model. The Professional Degree Graduate Education Development Program (2020-2025) proposed the implementation of the national plan, which involves the integration of industry and education in developing joint graduate cultivation bases. Both, enterprises and industries are encouraged to establish open bases for joint graduate cultivation. In order to cultivate high-end engineering talents who are urgently needed in Foshan’s advanced manufacturing industry, open bases for joint graduate cultivation were established in Foshan, Guangdong in 2015. This resulted in the cultivation of more than 1,600 engineering graduates by 25 universities and 152 enterprises. Considering the key role of mentors in graduate cultivation, the Foshan base built a “2+2” diversified mentoring model involving both the lead and deputy mentors in order to facilitate the cooperation between universities and enterprise mentors as well as improve the effectiveness of engineering practice cultivation. Such a diversified mentoring model has overcome the existing problems in the current dual mentorship scope for engineering graduates and pointed out the direction for the reform

of engineering graduate cultivation.

## 2. Problems in dual mentorship for engineering graduates

In the face of China's lagging graduate education, "mentor" is a nonnative term. The mentorship system originated in Cambridge University and Oxford University in the United Kingdom. Based on the experience and practice of foreign mentorship systems, the current mentorship system in China came into being. China's graduate mentorship has been defined in the *Dictionary of Degree and Graduate Education* as a result learned from the western graduate education, a basic system in the process of graduate cultivation, and a teaching management system, which is also known as the mentor responsibility system, where the mentor provides one-to-one guidance and takes full responsibility for the graduate's learning, scientific research, moral character, living, and other aspects [1]. The Ministry of Education has promulgated the *Opinions on Fully Implementing the Duties of Graduate Mentors in Fostering Character and Civic Virtue* and the *Code of Conduct for Graduate Mentors*, emphasizing the importance of mentors as the first person responsible for graduate cultivation. Ever since 2010, when the cultivation of full-time engineering graduates began, university-enterprise dual mentorship became the basic form of guidance.

The dual mentorship system is by no means a simple superposition of the number of "on-campus mentors plus off-campus mentors," but rather a collaborative mentorship system with clear responsibilities, rights, and division of labor between on-campus and off-campus mentors. Throughout the implementation, on-campus mentors focus on imparting basic theory and cultivating scientific research ability, whereas part-time enterprise mentors focus on teaching practical skills and developing product applications. While the former serves as the first person responsible for graduate cultivation who takes full responsibility for guiding graduates until successful graduation, the latter plays a subordinate role in joint graduate cultivation and mainly fosters practical professional ability in the direction of voluntary work. The inconsistency of their interests and demands, as well as the unequal responsibilities have given rise to certain problems in the dual mentorship model for professional degree graduates. Hu et al. pointed out that problems ranging from inadequate enterprise mentor resources and insufficient enthusiasm for guidance to the lack of flexibility in the curriculum system have existed in dual mentorship for engineering graduate cultivation [2-6]. Based on the agency theory and resource dependence theory, Shi et al. analyzed the root cause of the dual mentorship dilemma as incentive incompatibility within organizations as well as the resource conflict and resource deficiency between organizations [7-10]. Zhang et al. attributed the problems in dual mentorship to the lack of awareness and implementation in cultivation units, rigid mentor evaluation system, lack of effective communication mechanism between on-campus and off-campus mentors, the dominant role of the mentor-apprentice system, and the unscientific assessment and evaluation of off-campus mentors [11-15]. The dual mentorship for engineering graduates has been formalized as a result of the late development of education for full-time engineering graduates, which is worsened by various limiting factors. The reluctance of on-campus mentors in arranging graduate engineering practice in enterprises with specific scientific research tasks has engendered the metamorphosis of dual mentorship into single mentorship. It has been unveiled by Zhao that single mentorship agonizes from the flaws in the mentors' own knowledge structure, the disagreements in research directions between graduates and mentors, the lack of effective binding forces, the reverse of interdisciplinary integration, and other problems [16]. In response to the problems in dual mentorship, some researchers have explored and researched on multi-mentorship for professional degree graduates based on the dual mentorship model. For example, Lin et al. proposed the "industry-university-research-management mentor group" [17], Wang et al. put forward the "one responsible mentor plus multiple deputy mentors" model for graduates in landscape architecture [18], Huang introduced the concept of multilateral mentorship [19], Huang brought forward the concept of mentor community [20], and Zhu et al. proposed the enterprise mentor group model [21].

With the aforementioned research and the key problems in university-enterprise dual mentorship captured, a dual mentorship model has been proposed from the perspective of shared-interest community, focusing on the whole-process and all-factor participation of education and aiming to stimulate the enthusiasm of enterprise mentors to participate and play a dominant role in engineering practice education through the redistribution of functions and roles between on-campus and off-campus mentors. However, the research on multi-mentorship only suggested the reorganization of dual mentorship in an organizational structure. Due to the lack of stable and long-term external guarantee and management mechanisms, it remains a challenge for multi-mentorship to eliminate the problems existing in the implementation of dual mentorship.

### **3. Construction and practice of a diversified mentoring model in Foshan base**

#### **3.1. New carrier of Foshan base**

The fundamental problem of the implementation of the university-enterprise dual mentorship lies in the different interests and demands between universities and enterprises. Foshan base, as a new education carrier of university-enterprise joint cultivation base, has been established to provide basic assurance conditions for both sides and improve their enthusiasm. Foshan base can be recognized as an open base for industry-education joint graduate cultivation committed to building a platform for collaborative education and innovation through joint graduate cultivation as well as training and delivering excellent engineers to equip Foshan's advanced manufacturing industry. The base is operated based on the "1+N+N" mode of "Center + University + Enterprise," among which the center stands as an independent managerial organization responsible for the daily operation of the base.

#### **3.2. Reform assurance conditions provided by Foshan base**

The new education carrier provides better assurance conditions for the reform of the diversified mentoring model. In terms of financial guarantee, the base provides transportation allowance, mentorship post allowance, and performance allowance to university-enterprise mentors. Sponsorships for industry-education graduate cultivation have been established with a standard of RMB 30,000 or RMB 50,000 to support university-enterprise mentors in completing these joint graduate cultivation projects. Mentors are usually awarded for the scientific and technological achievements obtained and also supported in carrying out business incubation. In terms of institutional guarantee, the base has established a complete system involving mentor qualification selection, daily management, and assessment and evaluation. An incentive system has been established in universities for on-campus mentors to participate in the joint graduate cultivation and incorporate the joint cultivation of on-campus mentors into appraisal and employment. The base has also been urging enterprises to establish a management and incentive system for enterprise mentors and providing training opportunities for them to improve their skills.

#### **3.3. Construction of the "2+2" diversified mentoring model**

The "2+2" diversified mentoring model (**Figure 1**) consists of two lead mentors (a university mentor and a part-time enterprise mentor) and two deputy mentors (a moral education mentor served by the enterprise human resource director and a practice mentor served by R&D supervisor).

##### **3.3.1. Lead mentors**

The lead mentors are those in charge of the overall joint graduate cultivation, consisting of one university mentor and one enterprise mentor. Lead mentors are involved in the entire joint graduate cultivation process, including joint participation in graduate reviews and interviews, formulation of joint cultivation plans, dissertation opening and defense, as well as graduate assessment and evaluation. Lead mentors play the

leading role in joint graduate cultivation. With the university mentor covering academic guidance and the enterprise mentor offering scientific research guidance, both mentors take the lead in regular joint communication and coordination meetings and urge graduates to complete their learning, research, and development tasks. Through close cooperation, the main and deputy mentors promote university-enterprise collaborative innovation with the joint graduate cultivation as a link, including university-enterprise joint project applications, technological breakthroughs, declaration, and transformation of achievements.

### 3.3.2. Deputy mentors

In Foshan base, deputy mentors are responsible to strengthen moral education and engineering practice. Deputy mentors include moral education mentors and practice mentors, which are respectively served by the enterprise human resource director and R&D director. Moral education mentors are responsible for arranging accommodation and meals for graduates, educating them on safety, taking attendance and collecting weekly logs, as well as reporting and providing assistance in dealing with unexpected situations; on the other hand, practice mentors are responsible for selecting suitable R&D projects for graduates, guiding them in carrying out project training, and providing timely feedback to the main mentors on problems in engineering practice. Moral education mentors and practice mentors should regularly attend joint mentoring meetings organized by the lead mentors to solve the problems that occur in graduate cultivation. The “2+2” diversified coordination and mentoring model with lead and deputy mentors improves the quality and effectiveness of engineering practice education.

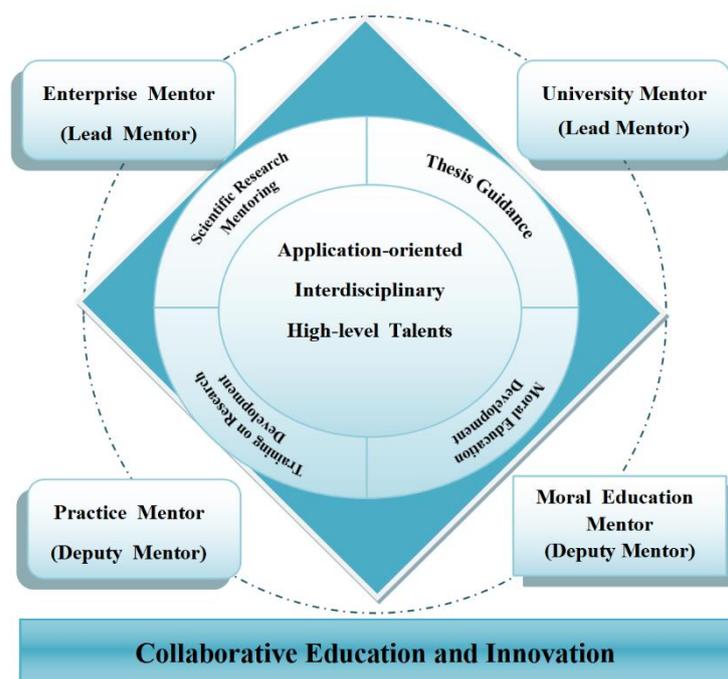


Figure 1. “2+2” diversified mentoring model

### 3.4. Implementation effectiveness

The implementation of the “2+2” diversified mentoring model has yielded relatively satisfactory results. Graduates tend to be satisfied with the base but less satisfied with the overall conditions of enterprises and the academic abilities of enterprise mentors. The quality of engineering graduate cultivation has witnessed a marked improvement. Comparing base graduates with non-base graduates of the same major from the same university, it can be seen that base graduates surpassed non-base ones by 1.4 pieces in the average patent number of utility models and RMB 3,157 in average salary. The profound cooperation between

university and enterprise mentors have resulted in a number of scientific research achievements. In short, the “2+2” diversified mentoring model promotes university-enterprise collaborative innovation.

#### **4. Conclusion and suggestions**

Foshan base is an open base for joint graduate cultivation, which provides assurance conditions for university-enterprise joint graduate cultivation and enhances the enthusiasm of university and enterprise mentors to participate in joint graduate cultivation. Having overcome the shortcomings of dual mentorship, the “2+2” diversified mentoring model, which has a close relationship with the key link between engineering practice and education, strengthens moral education, engineering practice, and diversified collaborative education. This practice has proven that the “2+2” diversified mentoring model can improve the quality and effectiveness of engineering practice cultivation. However, the fragmentation in development between universities and enterprises raises a challenge for both sides to achieve mutual benefit and a win-win situation in short term. On the other hand, enterprises remain as the weak link in graduate education. Given the job nature, enterprise mentors tend to emphasize practice while neglecting academic and innovative practice ability, thus failing to meet the requirements of joint engineering graduate cultivation. Suggestions have been made to further intensify the qualification audit as well as the supervision and guidance of joint cultivation enterprises, strengthen the training and guidance of enterprise mentors, and urge enterprise mentors to strengthen their academic standards and ability to improve the “2+2” diversified mentoring model and the quality of engineering graduate cultivation.

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#### **Disclosure statement**

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