

INDUSTRY PARTNERSHIP FOR GRADUATION STAGE OF HIGHER VOCATIONAL EDUCATION

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Abstract: Vocational education has been developing rapidly in China these years' Zhejiang University of Technology formulated a flowchart of industry partnership for the graduation stage in the light of characteristics and objectives of vocational education. After three years' experiment in industry partnership, the college has been successful not only in the training of students' ability of comprehensively applying what they learn into their work and in the training of their skill, but also in the preparation for their future employment. In this paper, the author makes a comparison between the traditional practice and the industry partnership in the graduation stage and, after analyzing their characteristics, concludes that the latter can achieve better results through strict management.

INTRODUCTION

Vocational education is a kind of education that aims to provide society with skilled workers for a specific job, to equip students with theories and skills essential to a position so that they will be qualified in their future work. With the development of industrialization, progress of technology and economic globalization and the resulting adjustment in industrial structure, higher vocational education has seen great development.

China drops behind in initiating higher vocational education, but it has seen drastic development in previous years. For example, in Zhejiang province, the number of students admitted to all kinds of vocational universities and colleges is increasing at an annual rate of about 30% since 1994 when the province made experiments in higher vocational education for the first time, 10-15% more than that enrolled in ordinary institutes of higher learning. The number of schools that engage themselves in higher vocational education increases from only ten-odd to more than forty, including all kinds of adult universities and colleges. Higher vocational education, being an important type of higher education in China, has won the approval of and support from people of all walks of life.

Enlightened by overseas advanced experiences in the pedagogical reform and practice on industry partnership, we put forward a program for industry partnership for the graduation stage of higher vocational education. Enterprises- and practice-oriented, the program was aimed to improve students' application ability and was listed into the school's pedagogical reform projects and launched in 1997.

THE PROCESSES OF INDUSTRY PARTNERSHIP FOR GRADUATION STAGE

According to our syllabus for junior college education, graduation work is scheduled in the sixth semester, i.e. the last semester, which lasts about 13-16 weeks. The students have completed common basic courses, technological basic courses and specialized courses and have taken part in all kinds of fieldwork, therefore they have grasped the basic theories and skills for a specific job or position or specialty.

In order to improve students' ability in combining theory with practice, we formulated a flowchart of industry partnership for graduation design as follows:

1. Mobilization meeting for industry partnership for the graduation stage
Time: in the beginning of the fifth semester.
Participators: College president in charge of teaching affairs and director of specialized teaching and research offices.
2. Consulting about industry partnership for the graduation stage.
Time: in the middle of the fifth semester.
Participators: Director of specialized teaching and research office and tutors of graduation work.
3. Projects of graduation design. The students have to find projects for their graduation designs and the teachers will contact the enterprises about such projects.
Time: by the end of the fifth semester.
Participators: Students and tutors.
4. Evaluation of the projects.
Participators: Tutors of graduation design.
5. The teachers shall determine the content for graduation design on the basis of their engagements in scientific research or in their cooperation with school factories.
Time: by the end of the fifth semester.
Participators: Directors of specialized teaching and research office, tutors and college leaders in charge of the matter.
6. Determining the projects of graduation work and completing relevant tables and documents for instruction and other arrangements.
Time: 1st week of the sixth semester.
Participators: Students, tutors, director of teaching and research office and leader in charge of the matter.
7. Working out reports about the projects, literature and pedagogical materials related to the projects.
Time: By the end of the 3rd week of the sixth semester.
Participators: Students, enterprise and school tutors.
8. Working in enterprises and starting the graduation work under the instruction of enterprise tutors.
Participators: Students, enterprise and school tutors.
9. Supervision and management by school tutors.
Time: Not later than one week before the oral graduation examination.
Participators: Students, enterprise and school tutors, and members of the oral examination group.
10. Graduation paper writing.
Time: The last week.
Participators: students, enterprises and school tutors.
11. Graduation work reporting, oral examination.

Participants: Enterprises and school tutors, and members of the oral examination group.

12. Grading.

Explanation about the flowchart:

1. Mobilization meeting for industry partnership for the graduation stage. The president-in-charge will give introductions about the forms, requirements and problems for attention in the graduation design with typical examples in previous years. Some enterprises will be invited to take part in the meeting. The students are required to strengthen contact with enterprises. They shall actively look for projects, solve all kinds of technical problems for enterprises, and participate in the product design and technical upgrading in those enterprises, thus making their contribution to the development of enterprises. To apply what they learn into their practical work can train them to improve their comprehensive quality. Through their efforts in looking for projects, the students can have a better understanding of enterprises and the industries to be engaged in. To take part in works in enterprises is the first step for them to enter into the society and is a preparation for their future employment. The president hopes that all of them can devote themselves to their works in enterprises.
2. Teachers of specialized teaching and research offices will push the students to take part in industry partnership, provide consulting services for them, offer suggestions and instructions to them, encourage them for their good ideas and correct the defects in their ideas.

Our experiences show that teachers' continuous push is necessary in this period, for some students will be discouraged when they are refused by some enterprises, some are not brave enough to look for projects for themselves. We hold that students can have a better understanding of the society and promote for themselves in the process of looking for a project with their own efforts, which is the first step for them to enter into the society.

3. After a period of hard work, the students will finally be accepted in succession to work in some enterprises where they can be familiar with their projects, about the progress of which they shall make regular reports to their tutors. The tutors will help them to analyze the feasibility of working on such projects and make arrangements for technical preparation. Meanwhile the teachers will find other projects in some enterprises through certain channels, from which they can select projects for graduation work. The projects that the teachers find are mainly for preparation for the graduation work, and are usually announced to the students in the end of the fifth semester. The students can make their own choice with consideration of their interests and other factors.

Our experiences tell us that not all the projects from enterprises are suitable for the students to work on and the projects are not enough for every student to have a project. So it is necessary for the teachers to select some suitable one from their own projects, or find some in the course of their contact with enterprises and make appropriate arrangements on the basis of each student's strong suit and the content of each project. In this way the graduation work will be able to carry out in an well-ordered manner.

- 4&5. Evaluation of the projects. Directors of specialized teaching and research offices and tutors will discuss and evaluate students' projects in terms of their types, difficulties and effectiveness before making final decisions. The projects will be classified as projects for graduation work, for technical preparation, for sub-projects and projects not suitable for graduation work. The decisions will be reported to the college for approval.
6. Relevant tables and documents for instruction and other arrangements shall be completed after the projects are approved by the college. The content of projects, goals and students' major work, detailed work arrangements, means and methods for examination and for

guaranteeing the quality of graduation work are initially determined.

7. Working out reports about their projects (gathering of literature and information related to the projects). The students shall get familiar with their projects' contents and requirements, draft up plans for the graduation work, sort out and gather materials related to their projects and work out reports about their projects. All these shall be finished in two weeks or in a shorter period when the students have made sufficient preparation.
- 8&9. According to regulations by the college, the enterprises which accept the students to work there on their graduation design are asked to appoint a tutor who is engaged in product development, management of production and technology with a professional title of engineer or higher. During their working in the enterprises, the students will work on their graduation project under the instructions of their enterprise tutors. The school tutors shall make necessary and timely contact with the enterprise tutors for information on the students' work and life and provide consulting services for the students. The students shall report to their school tutors about their progress in the enterprises, once a week in person for those who work in local enterprises, or once every ten days by writing or phone call for those who work in other places, so that the school tutors can check on their work and push them.

In order to find out students' progress in their work and their conduct in the enterprises and to guarantee the quality of graduation work, the college encourages and organizes relevant teachers and members of specialized teaching and research offices to go deep into the enterprises, which helps them to get information on the students' work and on the enterprises so as to set up or strengthen relationships with enterprises.

10. Writing graduation paper or design report. After they complete all the requirements about their graduation projects and have the approval from their tutors, the students can begin to write the graduation paper or design report. The paper or report is one of the main indexes to evaluate the students' achievements, so the students shall work hard not only to present a well-written paper or report which provides sufficient evidences and precise analysis to support the ideas, but also to submit installations for the project, photos evidencing the technical upgrading, the device itself and primary data and evaluations on the device's practicality, reliability, expected social and economic results.
11. Oral graduation examination. Strict examination procedures and systems are guarantees for teaching quality in the graduation stage. The industry partnership enables the students to make full play of their initiatives and to plunge themselves into their projects. The enterprise tutors are asked to take part in the students' oral graduation examination and offer their comments in written forms. The students are required to present their installations or pictures of such installations and to report about the effect and operation of such installations.
12. Grading. In grading, we put more emphasis on students' skills in practical work, the actual results of the projects and the evaluation given by the enterprises than their theoretical level because of the characteristics of vocational education.

COMPARISONS WITH ORDINARY ENGINEERING MAJORS IN THE GRADUATION STAGE

1. For higher vocational education, the goal of industry partnership for graduation stage is to enable the students to be familiar with and adapt to the practical works in modern enterprises. The students are supposed to work on the production front, to engage in and solve all kinds of technical problems arising in production. Their graduation works are more closely related to industrial production than that of ordinary engineering majors.

2. Industry partnership requires the students to be on the spot so that they can learn from the technicians and set out to work under their instruction. Through working on projects closely related to production, the students are able to adapt themselves to the work method of modern enterprises and improve their abilities in analyzing and solving problems. However, ordinary engineering majors usually finish their graduation design and paper in laboratories through means of theoretical analysis, simulation and emulation, so the training of practical work ability tends to be ignored.
3. Vocational students taking part in industry partnership focus on product design, equipment and technical grading and application of matured technology while ordinary engineering majors pay more attention to the application of new technology, development of new products and new technologies. The former serve for front production and the latter for technical repair and progress.
4. The industry partnership for the graduation stage requires more of a teacher who is supposed to be familiar with production and to know everything about product design, equipment and technical process in addition to theories. However, teachers of ordinary higher education are usually more suitable to work in the field of development and application of new technology, serving for technical progress and preparation.
5. Difficulties in choosing graduation projects. Students taking part in industry partnership for the graduation stage are required to look for projects for themselves, so it is quite normal that not all the projects they find are suitable for them to work on as graduation projects. Some of the projects are from enterprises located far away from the school, making it difficult for the students to go between the enterprise and the school. Some of the students would like to finish their projects independently and refuse to cooperate with other students. All these create difficulties for every student to have a project.
6. Difficulties in management. Our three years' experiences in industry partnership show that industry partnership brings up many difficulties in management though students have more opportunities to choose projects. Some of the students may have been engaged in works dealing with the graduation projects months ahead of schedule while others may not be able to find one when the scheduled graduation design is about to begin.

REWARDS FROM INDUSTRY PARTNERSHIP FOR GRADUATION STAGE

1. The industry partnership for the graduation stage enables the students to make full play of their initiatives. In the practical work environment, the students are able to improve their social ability and work ability, thus making effective and adequate preparations for future employment.
2. The industry partnership helps check the students on their grasp of theory and skill, and improves their ability in applying the theories into practice and in work skills.
3. The industry partnership strengthens the association between the school and enterprises, especially when the students win the commendation from the enterprises with their achievements. By means of industry partnership, the enterprises have a better understanding of students, thus laying a foundation for the students' future employment.

Through three-years' practice, we find that industry partnership for graduation stage of higher vocational education is practicable and therefore shall be popularized. The industry partnership not only conforms to the objectives of higher vocational education, but also helps improve students' ability in practical work, in applying theories, in social work and in preparing for future employment in an efficient way.

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