Practice and exploration of "cooperative education" from the perspective of the symbiosis theory

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Abstract: "Symbiosis" is a universal phenomenon in the biological universe and it also prevails in the social system. Cooperative education is an important path of colleges and universities to cultivate applied talents and the key to break through close development of newly built universities, homogeneous inefficient and relatively insufficient high quality school resources. The essay tried to study and explored cooperative education from the perspective of the symbiosis theory and explored a mutualism cooperative education mode.

By 2016, newly built universities of China have occupied a half portion in number. However, it has been clearly recognized that newly built universities have problems like insufficient strength of running a school, unclear school-running orientation and development targets, insufficient ability to serve the local, and weak entrepreneurial ability of students. To realize important intellectual support and talent support of newly built universities in regional economic and social development in a real sense and highlight their irreplaceability in local development, newly built universities must realize the secondary transition from new construction to new type (applied type). Since 2010, China has introduced relevant documents about transition of general universities to applied universities in succession, indicating that it has been a common sense of China and society to guide transformation of parts of local universities to applied universities.

The key to realize applied transformation is to practice "cooperative education". As a local university in the west region inhabited by ethnic groups, Xichang University has provided talent support and intellectual support to economic and social development of Liangshan area. In 2015, the university was ranked as the only public university of the first batch of "applied overall transformation". Department of Civil and Hydraulic Engineering has had profound exploration and practice in cooperative education according to the symbiosis theory. And the major Hydraulic Engineering was listed as "Sichuan special major" construction project and the major Civil Engineering was listed in the first batch of applied demonstrative majors of local general universities in Sichuan.

Development of symbiosis and the symbiosis theory

What is symbiosis? Different researches have different opinions from different aspects. Anton de Bary (1879) is the first one to define symbiosis as different biology closely living together. Gerald further expanded the range of symbiosis and attributed interspecies relations such as predation, phoresis, mutualism, commensalism and parasitism to symbiosis（Gerald， 1977）. The protozoologist, Dale.S.Weis also defined symbiosis as stable, lasting and intimate combinational

relationships among several cooperators （Dale.S.Weis，1982）. With development of the symbiosis theory, the international biology circle pays more attention to the symbiosis theory and the International Symbiosis Society (ISS) was established in April, 1997 in Massachusetts, Woods Hole of the United States, which has promoted exchanges of researches from various countries in different sub-fields of symbiosis and enhanced its connection and communication with other fields (such as ecology and general biological sciences). In view of wide influence of symbiosis, Claire Ainsworth et al (2005) listed symbiosis as one of the top ten greatest creations of the life world.

In a wide sense, symbiosis refers to that the nature is a symbionts, and animals, plants and human beings within it should be harmonious to realize co-existence and common prosperity. And in a narrow sense, symbiosis refers to combination status and degree of different biology and it means that two or more kinds of biology must depend on each other for existence according to certain modes and form a symbiotic relationship featured with coexistence and co-evolution due to demands of survival (Hong Limin, 1996).

Symbiosis is a universal phenomenon in the biological universe and it also prevails in the social system. Thus, symbiosis mentioned in the essay refers to relations between symbiosis units according to certain symbiosis modes in certain symbiosis environment. The symbiosis model that the essay took a reference from is “mutualistic symbiosis”.

Cooperative education modes from the perspective of the symbiosis theory

Cooperative education is a market and social demand-oriented operation mechanism. With diversification of demands of employers for talents, they cultivated by universities under the single-subject traditional theory on school management and personnel training modes cannot adapt to demands of economic and social development. From the perspective of the symbiosis theory, units that carry out “cooperative education” are in a symbiotic relationship, which are not administrative order or temporary measures to reform colleges and universities but an objective mutualistic relationship. And it is a process of talent cultivated participated by schools and enterprises and it fully takes advantage of different educational resources and environments of schools and enterprises and adopts the instrumental mode of classroom teaching and participation of students in enterprise practice to cultivate talents who can meet demands of different units. At present, universities should find out the entry point to perform it and maintain sustainable development. Department of Civil and Hydraulic Engineering of Xichang University had many favorable explorations in earlier stages; and to be more specific, it carried out “four cooperation” and realized “eight commons” so as to cultivate applied talents in a real sense.

Synergy of objectives of personnel cultivation

Personnel cultivation program is rigid file of schools to carry out teaching and it should not only meet requirements of professional norms on basic theory and basic skills of undergraduates but also reflect school-running orientation and characteristics. It indicates that above the national basic line and it leaves enough space for schools to have their own characteristics and serve to local demands on talents. Therefore, before formulating professional construction planning and talent training programs, investigation have been profounded in the civil construction industry of Liangshan area. Pay a return visit to employers and establish information base, invite experts of the industry to have professional consultation and demonstration meeting, basic quality requirements and professional skills demanded by universities and enterprises according to the market and general problems of graduates so as to formulate targets of professional construction planning and

professional personnel cultivation and solve the synergy problem of personnel cultivation and personnel demand. Moreover, according to targets of personnel cultivation, personnel cultivation programs should be formulated and personnel cultivating programs from links of theoretical teaching, experiment teaching, student teaching and practical teaching and from the aspects of curriculum provision, standards of class hour and connotation coverage, thus realizing zero distance connection between course contents and professional standards, and teaching course and production process should be examined.

Synergy of process of personnel cultivation

Enterprises should be involved in cultivation of professional talents to realize synergy of process of personnel cultivation. In the first year, students should be taken to relevant enterprises to have a visit and practice to help them cognize their majors, cultivate consciousness of engineering and establish the spirit and awareness of hardworking to serve to national hydraulic engineering and civil engineering. In the second and third year, students should understand current demands of employers for talents, basic quality and professional skills that they should obtain according to project seminars and practice of professional curriculum projects of employers to formulate their career planning rationally. Meanwhile, schools should transfer advanced technologies and training courses of enterprises into contents of courses, establish research and development courses which have application prospect for enterprises and enhance innovative ability. Moreover, they should combine with local characteristics, expand depth of seismic course of building structure and hold seminars for construction of new Li stockades to make cultivated serve to local construction. Graduation thesis and graduation project should select construction projects or projects of technological breakthrough under construction. And schools should solve practical problems and cultivate applied talents to serve to local economic and social construction according to practical production projects.

Synergy of teaching staff

Establish the synergy mechanism for teaching staff, plan teaching staff and part-time teachers as a whole. Explore and carry out two-way communication of teaching staff and carry out exchange and training of practical teaching skills among teachers. ① Invite first-line excellent experts to schools to give lectures so as to understand industry trends; ② young teachers should have a study in enterprises no less than two months each year and participate in solution of practical engineering problems so as to enrich topics of curriculum design and graduation projects and expand practical training; meanwhile, “school-enterprise two tutor " should be carried out, and students should be divided into learning groups of 5-8 and each group should be equipped with a campus tutor and off-campus tutor. Campus tutors are mainly responsible for public basic quality, professional basic quality and professional technical quality training. And off-campus tutors are mainly well-known entrepreneurs of the industry, managers of human resource department of enterprises, and principals of technical sections and they are mainly responsible for cultivation of professional skills and quality.

Synergy of quality evaluation of personnel cultivation.

Quality evaluation of personnel cultivation should be diversified, and subjects of evaluation are not only teachers and schools but also self-evaluation of students, evaluation of employers and study and evaluation of third party independent investigation institutions to employment quality of students. Scores of students observe to the principle of three-third system with evaluation of teachers making up 1/3, self-evaluation of students making up 1/3 and enterprise tutors making up 1/3. In the evaluation process, the extensive mode which just evaluates results should be avoided;

instead, process evaluation and result evaluation should be combined together. In addition, each link in the process of practice should be concerned to have a comprehensive evaluation according to cooperative ability, innovative ability, coordinative ability and the ability to solve problems of students in practice. Moreover, enterprises should be involved in quality evaluation of personnel cultivation so as to help employers to understand actual situation of each student and provide guidance to students according to requirements of posts to make them meet demands of employers.

Through the four synergies, Department of Civil and Hydraulic Engineering realized the "eight commons" preliminarily. That is, formulate applied personnel training standards together, to complete personnel cultivation programs together, to construct curriculum systems and teaching contents together, to construct practice and training bases together, to establish teaching teams together, to carry out cultivation process together and to evaluate cultivation quality together.

Existing problems and contradictions

Differences of universities and enterprises in target and value

Enterprises are targeted at pursuing economic benefits. In practical training, enterprises should assume corresponding logistical support and safety risks, which will increase production costs and make them cannot obtain economic benefits some times, thus enterprises are not willing to participate in teaching practice or do not have a high activity. In addition, contradiction of supply-side reform of student practice is prominent; universities have a week ability to serve to enterprises in scientific research, technology, talent and resource and cannot integrate resources in the institutional aspect to solve practical demands of enterprises. Thus, enterprises suffer a setback to cooperate with universities, and university-enterprise cooperation becomes a mere formality and does not have close connection.

Government provides guidance but no restrictions to enterprises

In the aspect of university-enterprise cooperation, government has introduced relevant guiding ideas, but there are no specific restricting measures. In addition, enterprises fail to obtain profits and talent advantages from supply-side reform of university-enterprise cooperation, and government fails to give play to its functions in guiding, supervising and managing university-enterprise cooperation. The results indicated that enterprises lack of responsibility, universities fail to perform their duties and governments lack of participation consciousness.

Imbalance between supply and demand of enterprise production and teaching process

Civil construction projects have their own characteristics such as periodicity, locality, compatibility and supportability which cannot coordinate with course arrangement, teaching progress, spatial distance, number of students, and logistical support of universities fail to provide stable, high quality and effective training service to students in course project and graduation practice. Thus imbalance between supply and demand is prominent.

A base shared mechanism has not been established yet

A same training base can fully take advantage of production technologies and equipment resources to provide training to close subjects and relevant majors of different schools so as to improve comprehensive utilization efficiency of the base. At present, a base shared mechanism has not been established yet, and bases often serve to a specific major, thus causing waste of resources.

Measures and suggestions

Guarantee basic economic benefits of enterprises and realize mutual benefit and win-win situation of university-enterprise cooperation

Without win-win mechanisms, cooperative education cannot be operated continuously and effectively. For universities, it is the basic mission of universities to improve quality of personnel cultivation and serve regional economic and social development. Enterprises and industries can recruit various professional personnel who can directly take up their posts and generate economic benefits and reduce human cost of enterprises, which is the major starting point for cooperation.

For universities: ① universities should take full advantage of their comprehensiveness of subjects, richness of educational resources and aggregation of scientific manpower, training employers for enterprises actively and helping enterprises to handle technical problems; ② they should carry out order-oriented training classes to cultivate talents for enterprises, and in this way, enterprises must be willing to offer advice to teaching practice. Only fully consider economic benefits of enterprises in university-enterprise cooperation can give play to subjective initiative of enterprises in the process of personnel training; and only improvement in depth and width of cooperation, university-enterprise cooperation can avoid becoming a mere formality.

For government: ① the government should actively promote relevant policies about university-enterprise cooperation, reveal its wills and create a favorable policy atmosphere; ② the government should relieve tax, introduce subsidy policies and reward progress to improve positivity of enterprise-university cooperation. Only with guidance and supervision of government can the quality of university-enterprise cooperation be improved in real sense.

For enterprises: ① enterprises should fully recognize that university-enterprise cooperation is necessary for them to improve research and development ability, infuse fresh blood, improve quality of staff and realize sustainable development; ② if enterprises participate in university-enterprise cooperation, it is their duty to assume corresponding social responsibilities, and talents cultivated with the participation of enterprises will serve enterprises and repay enterprises. Moreover, responsibility consciousness of enterprises will necessarily promote a sound development of university-enterprise cooperation.

Organize students to have internship and training to serve to enterprises

In view of that specific production enterprises have endogenous inert and external limitation when providing teaching materials to universities, universities should organize students to have internship and training to serve enterprises. Before the end of each semester, universities should submit course project plan, study targets, study contents and internship assessment indexes of the next semester or next school year to serve enterprises which will coordinate practice arrangement and interest compensation of universities and various production enterprises to realize sharing of responsibility and benefits and win-win situation in a real sense. It will inevitably require service enterprises to integrate possible practice and training resources of relevant enterprises within the area, grasp practice and training demands of universities on relevant subjects, establish enterprise resource pool, enterprise tutor pool and practical training pool of relevant subjects of universities. In addition, enterprises can provide practicing sites and enterprise tutors according to teaching

demands; and teachers of universities should understand production performance of enterprises in the practice progress so as to provide a path to cultivate “dual-tutor dual-capability” teachers.

Conclusion

To sum up, under the guidance of the symbiosis theory, Department of Civil and Hydraulic Engineering of Xichang University carried out whole-course cooperative education, organized students have internship and training in service companies, constructed a bridge between universities and enterprises, and solved demands of civil engineering major on practice, training and contradictions of endogenous inertness of supply-side of production enterprises. In this way, applied talent cultivation of civil engineering will be guaranteed from professional construction planning, target formulation of personnel cultivation, internship of professional courses, design and topic selection of graduation thesis, and cultivation of “dual-tutor dual-capability” teachers. Moreover, the win-win mechanism of university-enterprise cooperation will be realized, and universities and enterprises will be in a relation of mutualistic symbiosis and reflect their irreplaceability in development of local economic and social construction.

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