

The Construction and Practice of Programming Courses under the Background of Localization Industry

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Abstract

In order to solve the contradiction between the emergency of talents and the difficulty of employment for college students, the main goal of applied undergraduate is to train senior engineers with strong professional skills and urgent needs in the society. Therefore, the curriculum design of applied undergraduates needs to combine industry needs and competition requirements, so that students can quickly master the skills and qualities required by engineering personnel. This article takes the "C# Programming" programming course as an example to explain how to effectively integrate production and education in the course, promote learning by competition, and enhance the employment competitiveness of applied undergraduate students.

Keywords

Applied undergraduate; Integrated online and offline teaching; Integration of production and education; Promoting learning by competition.

1. Introduction

The contradiction between the scale, structure, quality, and efficiency of China's higher education in the process of forward development and the settlement of the contradiction are the internal driving force to promote the development of higher education. In recent years, enterprises have not been able to meet the demand for skilled, applied, and compound talents, and the "involution" of undergraduates has become more and more serious, which has caused the contradiction between the shortage of talents in enterprises and the difficulty of obtaining employment for college students. In order to resolve this contradiction, the "Outline of the Thirteenth Five-Year Plan for National Economic and Social Development" clearly proposes to "promote the transformation of qualified ordinary undergraduate colleges and universities to application-oriented", and the "National Vocational Education Reform Implementation Plan" (Guo Fa [2019]] No. 4) further put forward the development goal of "By 2022, a large number of ordinary undergraduate colleges and universities will transform to application-oriented" [1]. In order to solve the contradiction between the emergency of talents and the difficulty of obtaining employment for college students, the main goal of applied undergraduates is to train senior engineers with strong professional skills and urgent needs in society. For example, if our computer school wants to cultivate such talents, one of the effective ways is to base itself on localization, combine the needs of local industries, realize the transition from passive service to active service, and strive to become a regional supply of high-tech talents. Another effective way is to lead students in various project competitions, so that students can use the skills they have learned to complete the project.

2. The Dilemmas in the Construction of Applied Undergraduate Programming Courses

2.1. Lack of Practical Case Teaching Materials for Industry Applications

When companies recruit programming talents, they often pay more attention to practical experience, problem-solving skills and professionalism of applied talents. The current status is that most of the textbook cases of applied undergraduate programming courses emphasize the theory and the content is out of touch with reality, which is not conducive to the accumulation of practical experience in the industry, and it is also not conducive to the improvement of students' problem-solving ability [2]. For example, most of the textbooks of the "C# Programming" course are based on the VS development environment, C# grammar foundation, forms and controls, interface design, object-oriented programming, exception handling, keyboard and mouse operations, database programming, file operations And so on in sequence. Because all aspects of C# technology need to be involved, most of the cases in the textbook are fragmented and simple small programs. Teachers in colleges and universities will most likely explain step by step according to the cases in the textbook. Because the knowledge points are fragmented and simple, students will mistakenly think that it is simple and meaningless. This will cause students to have low interest in learning, perfunctory homework, and unable to accumulate. Practical experience and professionalism, especially difficult to cultivate students' ability to solve problems.

2.2. Lack of Teachers with Practical Industry Experience

Most of the teachers in universities come from universities, some are newly graduated graduate students, and some are teachers from other universities. Except for the education industry, these teachers have no practical experience in other industries, nor have they undertaken practical projects in other industries. They do not understand the needs and work processes of other industries, and cannot integrate specific industry needs into the course content or work tasks. Become a learning task one by one. Recruiters and managers in universities also generally have a sense of emphasizing academic qualifications and theoretical levels, while ignoring the practical ability of teachers in the profession. The title evaluation system of colleges and universities is also biased towards teachers with academic scientific research ability and strong theoretical ability, but is not friendly to teachers with professional skills and practical experience, and teachers who undertake corporate projects. Due to the lack of "dual-qualified" talents in the teaching staff, universities cannot meet the operating conditions for the integration of production and education [3].

2.3. Lack of Effective Resources for the Integration of Production and Education

At this stage, competition in the job market is becoming increasingly fierce, and there is an urgent need to optimize the talent structure in the field of higher education and cultivate more comprehensive talents that serve enterprises and society. Faced with this requirement, the transformation and development of applied undergraduate colleges and universities need to cooperate with enterprises, build a new model of integration of production and education, and solve the current situation of insufficient talents' practical ability [4]. The integration of industry and education has been proposed for many years, but it has remained on the surface for a long time and is difficult to penetrate. As an old corporate person who has worked in multiple industries for more than 10 years, the author believes that there are two fundamental reasons:

First, the enterprise pursues efficiency. Therefore, experienced employees do not have time to train students, and there are not enough employees to train a large number of students. It is

difficult to develop the apprenticeship and production-education integration strategy for students to learn in the enterprise.

Second, the company hopes to cooperate with universities to solve the difficult problems of the company, and hopes to outsource the project to universities, but does not trust the universities that lack industry experience. On the other hand, companies worry about that the efficiency of universities will not meet the requirements, so they are reluctant to invest before seeing the effect. And the lack of early investment by enterprises will lead to low enthusiasm for cooperation among college teachers, so the outsourcing strategy of integration of production and education is also difficult.

Under the vision of the integration of industry and education, the school and enterprise are two economic entities of different natures that are interdependent, mutually beneficial, and coordinated for development. In order to cultivate excellent talents for "double innovation" in the new era and promote the integrated development of the integration of production and education in colleges and universities, it is necessary to build a community of institutions, interests, quality and other institutional guarantees for the integration of school, enterprise, personnel, property, and property [5] [6].

3. Practice on the Construction of Application-oriented Undergraduate Programming Courses

The software industry has generated a greater demand for talents in the process of localization, which requires universities to properly localize curriculum construction and teaching models in talent training [7]. For example, the development of applied textbooks based on the school-enterprise cooperation model is oriented to job requirements and work processes [8]. In the process of integration of industry and education, it is necessary to actively maintain close contact with the company, understand the actual needs of the company, and ensure that the teaching content is seamlessly connected with the company's job ability requirements, so as to improve the ability of students to adapt to the job needs after graduation [9].

Facing the difficulties in curriculum construction, our college actively carries out localized curriculum reform and practice. This article takes the course of "C# Programming" as an example, and explores the construction of programming courses under the background of localization industry, and elaborates our practice process in the construction of "C# Programming" course.

3.1. Continuing to Build Benchmark Cases in Various Industries That Based on the Localized Industry

In the process of building the "C# Programming" course, we introduced the needs of local enterprises in the Pearl River Delta into the course, and guided students to master vocational skills in combination with actual projects of local enterprises. This process is advanced step by step, testing teachers' organizational and practical ability.

In the first step, industry-experienced teachers use their spare time to lead teachers and students without industry experience into the companies they have worked in, and take over auxiliary products that the companies do not have perfect hands to improve them for free, such as those from the medical equipment industry. Material inspection and quality inspection systems, and MES systems in the lithium battery production industry are perfect, accumulate practical experience in the intelligent manufacturing industry, and accumulate textbook cases and paper materials.

In the second step, the teachers used the cases accumulated in the early stage to proactively attack, actively visit the companies near the school that have software development needs, show our cases, gain the trust of the company, conduct research on the problems that the

company needs to solve, and propose free solutions Solutions for corporate pain points. For example, cooperate in the development of automated production lines for notebook computer processing companies, research and development of automated financial systems for cross-border e-commerce companies, and accumulate project resources for participating in the competition.

The third step is to take advantage of the cases and corporate trust accumulated in the first two steps, and teachers will undertake scientific research outsourcing projects with relatively high cost-effectiveness, and lead students to actual projects. Teachers should not care about the income of the project, but should focus on the project's scientific research value, the value of patents and papers, and the value of the provincial or national project funding declaration. After the project is successfully applied, the company may give a corresponding remuneration and follow-up cooperation contract.

Our first two steps are to provide services to companies for free. This has the following purposes: accumulate industry resources and trust, create industry benchmarks, accumulate materials for the compilation of teaching materials, and prepare students for competitions. Build a good foundation for teachers to apply for school, provincial, and national projects. Every time a project is started, teachers will either guide students to use the current project to register for various competitions, or lead a team of teachers and students to apply for school-level, provincial or national-level projects based on the value of the project. After completing the project, the honors and gains of each project are allocated to team members according to their work, and teachers are organized to write industry textbook cases and record industry case videos to create a rich ecological closed loop for subsequent student learning.

The courses involved in this article have constructed a complete learning website, which contains a wealth of teaching resources. Each chapter contains learning videos and sample codes. The sample codes have tasks that require students to complete in the classroom. Part of the time is used to answer questions, help students solve problems encountered in the project, and guide students to develop professionalism.

The process and results of students' participation in case creation, maintenance, and learning will be recorded on the Xuetong website, providing a credible case display platform for students' graduation and employment, and enhancing students' employment competitiveness.

3.2. Establish A Team of Competition Instructors with Practical Experience

In the process of creating industry cases, we use the school's part-time teacher system to continuously recruit part-time teachers with industry experience to cooperate, and at the same time recruit school teachers to join the competition instructor team. In the process of creating actual combat cases and competition projects, teachers with industry experience will lead school teachers with no industry experience to form a team, and gradually form a team of competition instructors with actual combat experience to guide student teams to participate in various competitions. After participating in practical projects in other industries, these teachers with no industry experience have a deep understanding of industry needs and work processes. They can incorporate specific industry needs into the course content, and can also participate in the compilation of teaching materials, the publication of papers, and the development of projects. The application can be rewarded in terms of the scientific research ability required by the school.

3.3. To Serve Enterprises Actively

In order to break the barriers that enterprises do not trust colleges and universities, colleges and universities need to put aside their attitude, change the way of school-enterprise cooperation, and consider issues from the perspective of enterprises. University administrators need to develop a more reasonable horizontal project cooperation mechanism with the goal of

improving teachers' actual combat ability and student competitiveness. They should abandon the attitude that projects require companies to pay at the beginning, and should be result-oriented. Before the management mechanism of colleges and universities is changed, the teachers participating in the course construction must have the courage to break the boat, abandon short-term interests, base on longer-term development, take incubating student entrepreneurial teams as their own responsibility, and accumulate enterprise resources and title evaluation resources as the goal, and seek at the same time Opportunity to lead students to become industry solution providers. Therefore, teachers need to take the initiative to find more local companies, take advantage of the time advantage of colleges and universities and student resources, actively serve companies, start with free cooperation, accumulate corporate resources and trust, and gradually attract more companies to come to cooperate, not only It can continue to create valuable industry cases to serve more students, and it can also take the initiative in subsequent cooperation, and obtain the opportunity to incubate student companies with the goal of providing high-level industry solutions.

4. Conclusion

The design of programming courses needs to be combined with industry needs and competition requirements, so that students can quickly master the skills and qualities required by engineering personnel. Class time is limited. To give full play to the guiding role of teachers in the classroom, it is necessary to create rich online resources and integrate online and offline teaching in order to achieve the best teaching effect in the limited time.

References

- [1] Zhu Kerong, Zhou Hua, Wu Xiaohong: The characteristics, construction path and dilemma of applied undergraduate courses[J], Vocational Education Forum, No. 03 (2019), p.62-66.
- [2] Shen Hongwei: Breakthrough in the construction of applied textbooks: the integration of learning and practical[J], Journal of Shaoxing University of Arts and Sciences (Education Edition), vol. 39 (2019) No. 03, p.35-40.
- [3] Pan Xiaoyan: Analysis of the integration of production and education in computer software teaching [J], Electronic technology, Vol.50(2021) No.09, p.90-91.
- [4] Wen Qian, Rong Luqing: Constructing a new mode of integration of production and education in applied undergraduate colleges [J], Teach and educate people (Higher Education Forum), No. 27 (2021), p.20-22.
- [5] Zhang Linguo, You Meiting: Thoughts on the path of constructing the "double high" construction and the integration mechanism of production and education[J], Journal of Hubei University of Economics (Humanities and Social Sciences Edition), Vol.18(2021) No.11, p.113-115.
- [6] Miao Yuxin: The construction of "double innovation" education community in colleges and universities from the perspective of industry-education integration [J], Journal of Huainan Vocational and Technical College, Vol.21(2021) No.05, p.87-88.
- [7] Kong Bo, Wang Shanshan: Analysis of localized curriculum construction and teaching mode [J], Journal of Jiamusi Vocational College, No.11(2018), p.181-182.
- [8] Yang Zeliang, Huang Liangwei, Long Xu, Yang Chunming, Xiang Guohong: Exploration of application-oriented textbook development based on school-enterprise cooperation mode [J], Times Education, No.19(2017), p.30-33.
- [9] Wang Fei, Ma Yuhao: Exploration and practice of a mixed teaching model of production and education under the background of new engineering disciplines [J], Journal of Anyang Institute of Technology, Vol.20(2021) No.06, p.107-108.