Research and Practice on the Integrated Training Model for High-End Applied Talents Based on Specialized and Bachelor's Degrees: A Case Study of the Software Technology Program

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Abstract. With the rapid development of information technology and the urgent demand of industries for high-quality technical and skilled talents, the talent cultivation model of integrating junior college and undergraduate education has gradually become an important direction for the reform of higher vocational education. As one of the core specialties in the emerging digital industry, software technology urgently needs to establish an efficient and well-connected talent cultivation system that integrates junior college and undergraduate education. By integrating the education of the software technology major at the junior college and undergraduate levels, and achieving an organic connection in the curriculum system, teaching content and training objectives, it is helpful to enhance students' comprehensive quality and engineering practice ability. This article takes the software technology undergraduate-graduate dual-degree program as an example, based on the concept of cultivating high-end applied talents, conducts research and practice on the construction and path exploration of the software technology undergraduate-graduate dual-degree model, aiming to provide a replicable practical model and theoretical reference for the cultivation of high-end applied talents through the undergraduate-graduate dual-degree program.

Keywords: Software Technology; Undergraduate Program Integration; Personnel training.

1. Background of the Construction of the Integrated Professional Training Model for Software Technology Undergraduate Programs

Driven by the digital revolution, with the continuous breakthroughs of emerging technologies such as cloud computing, big data, and artificial intelligence, software technology has become the key to driving industrial upgrading. The software industry has a strong demand for high-end application-oriented talents. To meet the urgent demand of the software industry for high-level application-oriented talents, the Chongqing government has been promoting the dual-degree education model between vocational colleges and undergraduate universities since 2018. In 2019, the College of Intelligent Information Engineering of Chongqing Aerospace Polytechnic and the software engineering major of Chongqing University of Science and Technology jointly implemented the dual-degree education program, which became a pilot project for the dual-degree education of software technology. By exploring a new model of "[1] convergence design, segmented implementation, and collaborative cultivation", the goal of systematically cultivating software technology talents with innovation and practical abilities was achieved[2].

The drawbacks of the current higher vocational education talent training and traditional specialized undergraduate education are gradually becoming apparent in the talent cultivation process. In the vocational education stage[3], the teaching content emphasizes basic skill training, with insufficient theoretical depth in the curriculum, resulting in students lacking systematic thinking and the ability to innovate in problem-solving when faced with complex software system development; Although traditional pathways from vocational education to undergraduate studies provide opportunities for students[4], there exists a disconnect between the vocational skill-oriented objectives of the higher vocational stage and the academic research-oriented objectives of the undergraduate stage. As a result, students may easily find themselves in a predicament of skill degradation and theoretical inadequacy. Therefore, it is urgent to establish a comprehensive talent cultivation model for software technology

that integrates design, phased implementation, and collaborative training, in order to meet the demands of the developing intelligent information industry.

2. Training of Professional Talents in Software Technology: Integrated Bachelor's and Master's Program

Chongqing Aerospace Polytechnic actively explores the training model of professional talents with software technology, and is committed to cultivating high-end application-oriented software technology talents to meet the needs of the times for the society.

2.1 Analysis of Talent Training Needs and Goals

With the rapid development of the software technology industry, enterprises have put forward higher requirements for practitioners in terms of professional ability, innovative thinking, teamwork and technical learning. Chongqing Aerospace Polytechnic, together with experts from Chongqing University of Science and Technology, investigated the industrial needs of Chongqing and surrounding areas, and put forward the goal of cultivating talents with software technology. The goal of talent training is to cultivate high-end application-oriented talents who master the basic theory and professional skills of software, and have a sense of innovation, practical ability and professionalism. Graduates can be competent in software development, software system integration, and software maintenance, possessing the technical skills and practical abilities of a software engineer.

2.2 Course System Research and Design

On the basis of in-depth analysis of industrial needs, Chongqing Aerospace Polytechnic and Chongqing University of Science and Technology have built an integrated curriculum system covering junior college to undergraduate to serve the cultivation of talents with software technology specialization. The curriculum system includes four modules: public foundation, professional foundation, professional core and practical teaching, which focus on literacy improvement, knowledge consolidation, skill strengthening and practical ability training. The curriculum system is designed to focus on the integration of theory and practice to enhance students' innovation ability, collaborative spirit and problem-solving ability.

2.3 Innovation in Teaching Methods and Means

In terms of innovative teaching, Chongqing Aerospace Polytechnic actively explores diversified models to improve the quality of teaching. Through project-based teaching, real development cases are introduced to improve students' practical ability, collaboration awareness and problem-solving ability. The flipped classroom is student-centered, with independent learning before class, practical training during class, and in-depth discussion after class to enhance learning initiative and interaction; Information-based teaching relies on an online platform to realize the whole process monitoring and feedback. The integration and application of a variety of teaching methods comprehensively improves the learning effectiveness and helps cultivate high-quality software technical talents that meet the needs of the industry.

2.4 Research on Industry University Research Cooperation Model

In order to achieve the goal of cultivating talents with software technology, Chongqing Aerospace Polytechnic actively promotes the integration of production, education and research, and builds an efficient school-enterprise cooperation mechanism. The college and enterprises jointly build internship bases, and invite enterprise experts to participate in course design, teaching and evaluation to ensure that the teaching is close to the needs of the industry. Through cooperative projects, internship training and graduation projects, students can deeply participate in practical projects of enterprises, so as to accumulate experience, improve their capabilities, enhance their employment competitiveness, and lay a solid foundation for career development.

2.5 Diversified Evaluation System Construction

In order to comprehensively evaluate students' learning outcomes, a diversified evaluation system is constructed through the software technology specialization, covering classroom performance, practical assignments, practical projects, innovation ability and other aspects, taking into account theoretical learning and practical ability training. Evaluation methods include classroom participation, project results, group mutual evaluation, self-evaluation, teacher evaluation, etc., focusing on the combination of process and results, and striving to comprehensively and objectively reflect the development status of students. The evaluation results are not only used for the recognition of academic performance, but also as an important reference for comprehensive quality.

2.6 Cultivation and Management of the Faculty Team

The School of Intelligent Information Engineering of Chongqing Aerospace Polytechnic attaches great importance to the construction of a teaching team with specialized software technology, and is committed to building a team of high-quality teachers with rich practical experience, strong teaching ability and understanding of the development of the software industry. Through the introduction of high-level talents, strengthening training and deepening school-enterprise cooperation, the college optimizes the structure of teachers and improves the teaching and scientific research level of teachers. Encourage teachers to participate in teaching reform and scientific research projects, stimulate teachers' enthusiasm and creativity, and provide strong support for talent training.

2.7 Individualized Development Support for Students

In order to meet the individual needs of students and stimulate students' innovative spirit, a wealth of professional courses and interest groups are set up in the software technology special course system to provide students with a broad space for development, and actively carry out innovation and entrepreneurship education. Through the establishment of professional courses, the organization of skills competitions, the implementation of project development, etc., the students are cultivated in innovative thinking and entrepreneurial ability, and students are provided with practical opportunities to fully stimulate their enthusiasm for learning.

Through the in-depth promotion of the above seven dimensions, we will effectively build the goal of talent training in software technology, provide high-quality talents for the software industry, actively contribute to the economic development of Chongqing, and boost the prosperity of the software industry.

3. Software Technology Specialization through the Post Course Certificate

In April 2021, the National Vocational Education Conference put forward new concepts such as the middle and high school education system, vocational and general education, and job course certificates, so as to promote the comprehensive education of job courses and certificates and improve the quality of education. Chongqing Aerospace Polytechnic responded positively and is committed to promoting the construction of a certificate system for software technology through post courses. Chongqing Aerospace Polytechnic combines the needs of the industry, designs highly applied and challenging job courses, integrates real projects of enterprises, cultivates students' professional skills and practical ability, and ensures that students can quickly adapt to job needs. At the same time, a multi-level competition system covering the school, Chongqing municipal and national levels will be built to stimulate students' enthusiasm for innovation and practice, promote exchanges and cooperation among students, and create a good learning atmosphere.

In order to ensure the quality of the implementation of the post course certification system, Chongqing Aerospace Polytechnic has formulated scientific and standardized certification standards and processes, established a professional evaluation mechanism, and invited industry experts to evaluate students' achievements to ensure that the evaluation process is fair and transparent. Chongqing Aerospace Polytechnic has set up multiple incentive policies, including bonuses, honorary

certificates and innovation credits, to stimulate students' enthusiasm to participate in competitions and practices; Continuously deepen collaboration with enterprises and research institutions, jointly develop curriculum resources, provide practical bases and technical support, expand channels for student practice, promote in-depth integration of teaching content with industry needs, and cultivate high-quality application-oriented talents that meet the demands of the software market.

4. Conclusion

To sum up, this paper takes the software technology specialization of Chongqing Aerospace Polytechnic as an example, and conducts systematic research and in-depth discussion on the construction background, training path, curriculum system, and post course certificate of talent training mode. The research shows that it is an effective way to achieve the goal of cultivating high-end applied talents by constructing a scientific and reasonable integrated curriculum system, innovating teaching methods, strengthening industry-university-research cooperation, and promoting the deep integration of post-course competition certificates. In the future, Chongqing Aerospace Polytechnic will continue to deepen the reform of education and teaching, optimize the allocation of resources, improve the talent training mechanism, and continuously improve the quality of talent training, so as to provide solid talent support and intellectual guarantee for the development of the software technology industry.

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