The Exploration and Research of Talent Training Ideas in Interdisciplinary Background

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Abstract. Talent cultivation is the most core task of universities. With the development of society, the ideas and plans for talent cultivation are also constantly being adjusted. Compared to the traditional talent cultivation method of focusing on academic disciplines, it has gradually shifted towards cultivating composite talents with interdisciplinary backgrounds. This paper will take this new talent training method as the research object, take electronic information engineering as an example to study, and explore a new idea based on cross-disciplinary talent training suitable for social development.

Keywords: Talent cultivation, Interdisciplinary, Electronic Information Engineering, Composite talents.

1 Introduction

The fundamental task of higher education institutions is to cultivate talents. The cultivation of innovative talents should focus on national strategies, integrate into local economies, and actively incorporate into meeting the urgent demand for high-quality educational resources and market economy competition in society. In response to the current social development needs, the requirements of employers for undergraduate talents are also changing. Taking electronic information majors as an example, in addition to possessing professional knowledge and skills in electronic information engineering, employers need more innovative talents who also have certain basic knowledge and application abilities in communication, control, computer, and other fields.

2 Research Significance and Necessity

In accordance with the requirements for personnel training in the Catalogue and Introduction of Undergraduate Majors of Ordinary Colleges and Universities issued by the Ministry of Education, taking the electronic information engineering major of our university as an example, the main goal of personnel training at this stage is to cultivate people with basic theories and professional knowledge in electronic technology, signal

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applied talents who can be engaged in the product design, development, manufacturing, application, management and maintenance of various electronic equipment and information systems in relevant enterprises and institutions in the field of electronic technology, information communication, intelligent control, etc.

As can be seen from the above training objectives, electronic information professionals need to have the ability to design, develop, manufacture, apply, manage and maintain all kinds of electronic equipment and information systems, and the training scope of this ability has involved in addition to the electronic information department, such as computer, automation, electrical and other multidisciplinary professional knowledge. It can be concluded that the demand for electronic information engineering professionals is no longer limited to the knowledge of a certain professional field, but has changed to the talent with interdisciplinary knowledge background.

However, at present, talent cultivation in universities often distinguishes disciplines and majors based on their respective departments, with each discipline and major independently formulating their own training plans. They have not established a platform with interdisciplinary integration, and their closed nature hinders the reasonable construction of student knowledge structure. The professional talents it cultivates are no longer sufficient to meet the talent needs of employers. Therefore, in undergraduate education, how to break the existing talent training framework[1], design talent training programs that meet the needs of social development in the new era, solve the barriers between universities and schools, and cultivate talents with interdisciplinary knowledge background that meets the needs of the times[2].

3 The Idea of Making Talent Training Program under the Background of Interdisciplinary

Interdisciplinary refers to the communication and cooperation between different subject areas, and it is an interdisciplinary approach aimed at solving complex problems that cannot be solved by a single discipline. The significance of interdisciplinary is that it can promote the integration and innovation of knowledge, and promote the interaction between disciplines, so as to better solve practical problems. The proposal of interdisciplinary integration in undergraduate talent cultivation aims to cultivate students with basic knowledge in other related disciplines besides their own major, and the ability to solve complex interdisciplinary problems[3]. Considering the characteristics of engineering majors, the demand for talents who need to solve complex problems in today's society is increasing year by year, and the cultivation of talents with interdisciplinary backgrounds is also more important[4].

At present, the talent training of colleges and universities is mainly guided by the talent training program, so the new ideas of colleges and universities for talent training are mainly reflected through the revision of the talent training program. The talent training program is a normative document for the school to implement the overall requirements of the Party and the state on talent training, organize teaching activities and arrange teaching tasks, and is the basic basis for the implementation of talent training and quality evaluation. Taking the electronic information engineering major of our

university as an example, the organizational structure of undergraduate courses in the talent training program is mainly divided into four categories, which are general courses, specialized courses, concentrated practice courses and extended courses. General education is divided into two parts: public compulsory course and public elective course. The specialized course is divided into three parts: specialized basic course, specialized core course and specialized elective course. Among them, all engineering majors in general education are opened and arranged by the school. The other three categories of courses are designed and formulated according to the ideas and objectives of talent training in each discipline[5].

3.1 Reflect the Interdisciplinary Connotation in the Curriculum System

3.1.1 Improve the Connotation of Professional Curriculum Construction and Deeply Integrate Multidisciplinary Knowledge.

In simple terms, specialized courses refer to the important courses closely related to the major of the discipline. The main task of offering this course is to enable students to master the necessary basic professional theories, basic professional knowledge and basic professional skills, understand the frontier science and technology and development trend of the major, and cultivate the ability to analyze and solve practical problems within the scope of the major. Therefore, in training students with interdisciplinary background, we should first consider how to realize interdisciplinary in professional courses. According to the school's subdivision of specialized courses and combined with national standards, the two types of courses, specialized basic courses and specialized core courses, have strict requirements for opening courses. Therefore, the setting of interdisciplinary courses can be adjusted in the setting of specialized elective courses and extended courses that have a certain connection with majors. For example, in the field of electronic information engineering, it is possible to consider selecting courses from other disciplines, such as Introduction to Artificial Intelligence, Principles of Automatic Control, Speech Signal Processing, Python Language Fundamentals, etc[6].The opening of this course can broaden the professional malleability of students majoring in electronic information engineering and expand their thinking mode, so as to better apply professional knowledge to practice. At the same time, in the establishment of this type of course, it should be distinguished from other courses. It is recommended to mainly focus on the experimental and practical aspects of the course, and strengthen the proportion of experimental and practical hours in the total class hours. The proportion of theoretical and experimental practical parts can be considered to be between 2:1 and 1:1[7].

3.1.2 Strengthen the Application of Interdisciplinary Knowledge in Curriculum Design.

Curriculum design is a very important comprehensive practice teaching link in college talent training. It belongs to the category of concentrated practical courses in the talent training program, which mainly reflects the practical application of professional courses in life. Course design usually adopts centralized teaching method, and the

whole process is carried out in professional laboratories or relevant practice places. Usually after the completion of the relevant professional courses in each semester, for some important professional courses will be carried out one or two weeks (28 or 56 class hours) of course design courses. Through the implementation of such courses, students can be inspired to think, exercise their hands-on ability, and cultivate their ability to discover and solve problems, especially the ability to solve complex technical problems. Therefore, the teaching of such courses often requires the application of interdisciplinary and cross-professional knowledge, so as to solve professional problems from a more comprehensive and in-depth professional perspective, and provide students with a platform for practical application of knowledge of different disciplines.

In the establishment of such courses, the concept of interdisciplinary integration should be integrated throughout the entire process. Starting from the selection and design of topics, the selection of topics should mainly include interdisciplinary background knowledge, and student teams are required to participate in the entire process from receiving the topic to completing it.

The guiding teacher can provide guidance and evaluation on ideas, plans, and implementation effects to ensure that the development path of the project does not deviate from the original guiding ideology. Taking single-chip microcomputer Principle and application course design as an example, the main content of this course is to use STC89C51 single-chip microcomputer as the control core to control some common components, such as keys, light-emitting diodes, resistors, capacitors, buzzers, digital tubes, etc, to achieve some simple functions. The interdisciplinary knowledge used in the entire design process is relatively limited, and the improvement of students' abilities through this course design is also limited. If we start from the perspective of exercising students' practical application ability of interdisciplinary knowledge, in order to better cultivate their ability to solve practical problems, the setting of the project should be based on a microcontroller as the control core (such as STM32), combined with various sensors, Based on the actual problems of the project, combined with wired or wireless control methods, control is carried out through motors or servos to achieve certain functional devices with practical application capabilities. At the same time, in the design process, relevant programming languages should be combined to complete the software program design and simulation of the system, in order to better achieve hardware functions. It can be clearly observed that the subsequent projects involve not only knowledge related to electronic information engineering, but also interdisciplinary knowledge such as computer, communication, automation, electrical engineering and its automation, and the Internet of Things. It is of great help to support the theoretical learning of interdisciplinary professional courses, strengthen the practical application of electronic information engineering, and enhance students' ability to handle complex problems[8].

3.1.3 Exercise Interdisciplinary Knowledge and Skills through Extracurricular Internships and Practices.

Extracurricular internships and practical courses are also an important part of cultivating university talents with interdisciplinary backgrounds. Taking our school as an example, in the talent training program, extracurricular internships and practical

activities are mainly divided into three parts according to the needs of talent training. They are professional cognitive internship stage, professional internship stage, and graduation internship stage. The format of this type of course is no longer limited to conventional teaching methods and is no longer limited to schools. It is often conducted by inviting experts to come to schools or going to enterprises to learn and exercise, for example, inviting experts and scholars from various industries to give relevant practical lectures, and at the same time, going to school enterprise cooperation units that establish connections with the school to carry out internships and practices. In order to better exercise students' cross-knowledge integration and application ability in extracurricular internship and practice stage, high-tech enterprises should be considered as the main enterprises when contacting internship related enterprises, and close contact with related industries, so that students can have close contact with the latest knowledge of their major and practical application in society. Let the students more clearly understand the necessity of interdisciplinary knowledge learning in the practice, let the students realize that to become a talent with interdisciplinary knowledge background, can better serve the society, better apply the professional skills and knowledge learned to solve complex technical problems.

3.2 Improve Teachers' Interdisciplinary Application Ability in Teacher Training

As the first person responsible for cultivating college students, teachers are also the ones who have the most contact with students. Plays a crucial role in the growth, knowledge accumulation, and learning enhancement of students. Universities need to cultivate professional talents with interdisciplinary backgrounds and cultivate the ability of students to solve complex problems. Firstly, it is necessary to ensure that our teachers have relevant technical skills and the ability to solve complex problems. Therefore, cultivating a group of teachers with interdisciplinary backgrounds is also a prerequisite for cultivating talents with interdisciplinary backgrounds in universities. In order to ensure the quality of cultivating students with interdisciplinary backgrounds, teachers are required to keep up with the development of technology and continuously improve their professional skills[9]. Specific requirements include:

(1) Participate in various academic activities, conferences, and forums. Organize teachers to actively participate in interdisciplinary academic seminars. This helps teachers to communicate with experts and scholars from different disciplines, understand the cutting-edge dynamics and emerging interdisciplinary fields of the subject.

(2) Carry out scientific research and teaching research with interdisciplinary characteristics. Actively promote teachers to actively apply, lead and participate in various interdisciplinary research and teaching projects, and exercise their ability to integrate knowledge and skills from different disciplines. At the same time, it can also promote communication and cooperation among teachers from different disciplines.

3.3 Promoting Development through Systems and Jointly Promoting the Cultivation of Interdisciplinary Talents

The cultivation of talents with interdisciplinary backgrounds not only starts with talent training programs and teacher team construction, but also requires the establishment of a sound and complete training system. Promote development through systems and promote the development of interdisciplinary talent cultivation. The establishment of its system is mainly carried out from the following three aspects.

(1) Top level design at the school level

(a) Establish a mechanism for interdisciplinary cooperation and exchange within and outside the school, build a cooperation platform, and promote communication and cooperation between different disciplines.

(b) Establish a dedicated recognition and reward mechanism to recognize and reward teachers who have achieved outstanding results in interdisciplinary fields, in order to motivate them to actively engage in interdisciplinary research.

(c) Establish a cross disciplinary project management system, standardize the management of cross disciplinary projects, and ensure the research quality of the projects.

(2) Encouragement and incentives at the level of secondary colleges

(a) Establish a credit mutual recognition system, based on the characteristics of each major and the interdisciplinary situation of the college, establish a complete credit mutual recognition system, and encourage students to actively participate in relevant professional courses outside of their respective majors.

(b) Establish a sound system for encouraging subject competitions and projects, encourage students to actively participate in various subject competitions and research projects, and enhance their ability to solve complex professional problems by participating in interdisciplinary knowledge learning and application[10].

(3) Team building at the teacher level

Establish a curriculum team composed of professional teachers with interdisciplinary backgrounds or teachers from different disciplines to jointly research, construct, and cultivate courses with interdisciplinary foundations[11].

4 Evaluation and Tracking of Personnel Training with Interdisciplinary Background

Whether talent cultivation conforms to the development laws and whether it can cultivate truly interdisciplinary talents can be evaluated through feedback from both schools and society.

4.1 On Campus Evaluation

On campus evaluation can be reflected by the achievements of students cultivated in the context of interdisciplinary studies on campus. Mainly reflected in students participating in various professional subject competitions, scientific research projects, patent applications, and paper writing and publication.

Through subject competitions, students can enhance their ability to solve complex problems. At present, most professional subject competitions aimed at undergraduate universities often require students to have interdisciplinary professional knowledge. In the actual competition process, students need to have the ability to integrate various relevant knowledge they have learned. Taking the National College Student Intelligent Car Competition as an example, the competition requires the participating student team to have knowledge in various aspects such as electronic circuit design, communication, control, intelligent recognition, etc. The software and hardware parts of the intelligent car used for the entire competition require students to personally participate in the design and production within a certain design framework. Therefore, it is recommended to conduct interdisciplinary talent cultivation while introducing comprehensive and multidisciplinary collaborative subject competitions to test whether talent cultivation based on interdisciplinary backgrounds meets the requirements and reflects its unique advantages through subject competitions.

In addition to academic competitions, participating in scientific research projects, applying for patents, and writing and publishing papers are also good ways to test the effectiveness of talent cultivation based on interdisciplinary backgrounds.

4.2 Social Evaluation

Social evaluation is also an important indicator for testing the quality of talent cultivation. The most direct declaration of social evaluation is the analysis and evaluation of the employment situation of college graduates based on the interdisciplinary background. By tracking and analyzing the employment situation of college graduates under this training model, it is possible to intuitively understand whether the quality of talent cultivation based on interdisciplinary backgrounds meets the training objectives. Starting from the nature of the employer of graduates and the initial evaluation of graduates by the employer, this study examines the relevant work that this type of student can undertake at the social level, as well as the employer's evaluation of the initial work ability of this type of student, and combines the two to analyze whether the quality of talent cultivation based on interdisciplinary backgrounds meets expectations at the social level[12].

5 Summary

The exploration and research of college talent training ideas is a road without end. The standard of talent training is also constantly revised along with the development of higher education. This paper is based on the interdisciplinary background of talent training model exploration and research is based on the current stage and the follow-up of a longer period of national social demand for talent extracted. Whether the training mode meets the needs of the country and society for talents still needs to pass a long time test. It is hoped that through the exploration and research of this training mode, a new path can be found in line with the talent training in colleges and universities, so as to provide a certain research basis for the subsequent talent training. At the same time,

it can be promoted to other majors, especially engineering-related majors, to train high-tech innovative talents for the national society to adapt to the development of The Times. And it will be promoted to other majors, especially engineering-related majors, to train high-tech innovative talents for the national society to adapt to the development of The Times.

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