

# Reform of the Training Mode of Information and Computing Science Majors in Application-Oriented Universities under the Background of Artificial Intelligence

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**Abstract** – With the advent of the era of artificial intelligence, promoting the development of all walks of life, with the in-depth development of educational informatization and the change of social needs, the cultivation of talents in application-oriented undergraduate colleges and universities is also facing huge challenges. This paper analyzes the existing problems in the training of information and computing science professionals in colleges and universities, and puts forward the methods, implementation plans, expected effects, and popularization and application of information and computing science professionals in colleges and universities, in order to provide reference for the training reform of information and computing science professionals in the context of artificial intelligence.

**Keywords** – Application-Oriented Universities, Information and Computing Science Majors, Talent Training, Reform.

## I. BACKGROUND AND SIGNIFICANCE

The vigorous development of cloud computing, big data, Internet of Things and other technologies has promoted the digitalization, informatization and intelligent process of society, and artificial intelligence has benefited from the support of large data volume, large storage and large applications, and its application scope has also come out of the laboratory and integrated into the life applications of ordinary people, such as common sweeping robots, intelligent customer service, intelligent manufacturing, etc., people have entered the "era of artificial intelligence". Artificial intelligence has become an important engine of economic development in the new era, and the development of artificial intelligence has become a national strategy. The development of artificial intelligence has given birth to a new technological revolution, which has triggered the continuous emergence of enterprises in new industries, the continuous updating and iteration of old industries, and put forward some new requirements for talents in related industries. The development of artificial intelligence has also had a great impact on education and teaching. The major of Information and Computing Science is an interdisciplinary major of information science, computing science, operations research and control science, etc., which mainly cultivates talents with a solid mathematical foundation and core knowledge of information technology, strong algorithm design, software development, data analysis and information processing capabilities, and engaged in information, education, science and technology and other fields. As an application-oriented undergraduate university, the information and computing science major mainly cultivates high-level applied talents, which shows that application-oriented talents continue to change in the face of changes in majors caused by artificial intelligence, corresponding industry enterprises and new needs for talents.

At present, there are still some deficiencies in the training of information and computing science professionals in colleges and universities: (1) The development and changes of the times, especially the changes in artificial

intelligence, are not implemented in a timely manner. It is mainly manifested in the inaccurate positioning of talent training goals. (2) The talent training system is not scientific enough. The main manifestations are: the curriculum system is scattered and unsystematic, and the curriculum content is not organically integrated with the development of the current era and the practical needs of society; information and computing science is a practical discipline, but the training of practical ability is insufficient; and the cultivation of innovation ability is insufficient. (3) The reform of teaching methods and methods is insufficient, and it cannot be fully integrated into information technology and closely integrated with industry enterprises in the new era. Therefore, it is necessary to reform and innovate the training mode of information and computer science professionals, especially the information and computer science majors in provincial colleges and universities, which should be connected with the industrial development and social needs of emerging fields, accurately locate the talent training goals, build a scientific and reasonable talent training system, and create high-level applied talents needed by the times and society.

This study will study the reform of the training mode of high-level applied talents in information and computing science in the context of artificial intelligence. In line with the development of the times and the needs of society, we should accurately locate the goal of talent training, build a reasonable talent training system, carry out practical exploration, form typical cases, cultivate high-level applied talents in information and computer science that meet the needs of the times, and provide useful reference for other universities.

## II. RESEARCH CONTENT AND PROBLEMS

There are three aspects of this study:

- (1) Investigate the changes in industries and enterprises caused by artificial intelligence and the impact on the training of information and computing science professionals.

At the same time, it is necessary to study what capabilities are needed by industry enterprises under the impact of artificial intelligence, as well as the education situation of similar colleges and universities, the employment and development of graduates of this major, and conduct comprehensive data analysis to clarify the new needs of the times for the training of information and computing science professionals.

- (2) Redesign the talent training objectives and build a "three-in-one" talent training system.
  - (i) In line with the changes in the industry and enterprises caused by the development of the times and the new requirements for talents, reposition the training goal of information and computer science majors in application-oriented undergraduate universities.
  - (ii) Construct a "three-in-one" talent training system of "curriculum system + practice + innovation": according to the new goal of training information and computing science professionals, reconstruct the multidisciplinary cross-integration professional curriculum system that adapts to the development trend of new technologies and new industries and social needs; build a practical teaching system for the cultivation of practical ability and practical training ability of enterprises in the benchmarking industry; curriculum the training program of innovative practical ability and integrate it into the talent training program in an all-round way, so as to create an innovation and entrepreneurship training system.
- (3) Implement the implementation plan for the reform of talent training.

- (i) How to use the development and change of information technology to reform teaching methods, methods, and means, as well as the methods, methods, and means of examination and assessment.
- (ii) How to benchmark the ability needs of industry enterprises, strengthen the cultivation of practical ability, and form a systematic operation system.
- (iii) How to cultivate innovation and entrepreneurship ability in line with the changes of industry enterprises in the times and the needs of information and computing science professional innovation talent training, and form a systematic implementation system, including innovation project guidance, competition carrier, task driven, etc., to create a new innovation ability training system.
- (4) Research and formulate a number of typical cases.

The professional teaching, practical teaching, and innovative education in the classroom are condensed into high-level typical cases.

In short, this study studies the reform path and methods of cultivating high-level applied talents in information and computing science from the aspects of talent training goal positioning, curriculum system setting, and practical innovation, and proposes specific measures and implementation plans in a targeted manner, and produces excellent typical cases and teaching and research papers.

The key questions to be addressed in this study are:

- (1) Solve the problems of unclear professional positioning and unreasonable curriculum system;
- (2) Solve the problems of deviation between teaching content and actual needs, imperfect practice and innovative teaching links, and single evaluation methods;
- (3) Solve the problem of the implementation of the talent training model.

### **III. REFORM PROGRAM DESIGN AND PROBLEM-SOLVING APPROACHES**

#### *1. Reform Plan Design*

Construct a feasible training model for high-level applied talents in information and computing science that meets the development of artificial intelligence technology and the needs of the industry, build a "three-in-one" talent training system that organically integrates "curriculum + practice + innovation", implement the implementation plan of the talent training model, formulate typical reform cases, and form an artificial intelligence-empowered information and computing science professional talent training innovation system.

##### *(i) Research and Research*

The survey includes four levels: industry macro research, enterprise micro research, research on the running of similar colleges and universities, and research on the employment situation of graduates. Specific research methods include: visit method, discussion method, questionnaire survey method, data inquiry method, telephone survey method, etc.

##### *(ii) Design System*

- (a) Reposition the goal of talent training. Accurately locate the goal of talent training, consolidate the foundati-

-on of students' mathematical knowledge, cultivate innovative thinking, be proficient in computer algorithms, and improve students' ability to apply mathematical knowledge and computer algorithms to solve practical problems in the field of artificial intelligence technology.

- (b) Construct a multidisciplinary professional curriculum system. Courses on the origin of mathematics, brain cognition and introduction to artificial intelligence are added to the general education course module, neural network and machine learning are added to the professional education course module, speech recognition, video processing, human-computer interaction, natural language processing and understanding, robotics and other courses are added to the extended education course module, and robot design and practice are added to the practical teaching course module.
- (c) Strengthen the practical teaching system. Strengthen the practical teaching system based on the three practice platforms of basic experimental ability training, professional training ability training and school-enterprise joint training: 1. Set up experimental courses in all basic mathematics courses such as mathematical analysis, increase the number of experimental class hours for existing professional courses in proportion to the weight of the existing professional courses, and establish basic course laboratories and professional basic experimental platforms. Second, on the basis of the existing experimental conditions, increase the construction of professional training platforms, and set up a number of professional training laboratories. Third, enterprise tutors participate in the whole process of talent training from the beginning of students' enrollment, and achieve in-depth collaboration between schools and enterprises through course teaching, internship practice, project research and development, and targeted training.
- (d) Deepen the innovation and entrepreneurship training system. The innovative practical ability training program is curriculum-based and integrated into the talent training program in an all-round way. Encourage eligible students to actively participate in vocational qualification examinations, encourage students to participate in various training and competitions, explore joint training with enterprises to train students to participate in industry competitions, etc., encourage teachers to transform the latest scientific research achievements into teaching content in a timely manner, and encourage students to enter teams and laboratories to participate in project work.

(iii) *The Implementation Plan*

- (a) Reform teaching methods and promote the diversification of teaching methods. With the help of multimedia technology, online courses are built on the online teaching platform. The content of teaching materials and teaching courseware is electronic and fragmented, synchronous teaching videos and micro-lessons and supporting exercise class videos are recorded, task points are set to guide students to learn independently, and discussion and exchange areas are opened on the platform to publish discussion questions. It adopts a combination of online and offline, and integrates through flipped classroom teaching method, case teaching method, project-driven teaching method, interactive teaching method, simulation teaching and other methods. (b) Reform the teaching practice link and cultivate students' practical ability. Construct a new practical teaching system based on basic training platform, comprehensive ability training platform, and engineering practical application ability training platform. The case teaching method is adopted, and for practical engineering problems, students are task-driven, so that students can carry out progressive practical process training. Through the in-depth promotion of the combination of science and education, the

integration of industry and academia, and school-enterprise cooperation, we will carry out internship training and graduation design around the needs of enterprises.

- (c) Create a task-driven innovation capability training system. In the way of project leading, competition carrier, and task driven, we will create a new innovation ability training system. Organize students to participate in the National Mathematical Contest in Modeling, the "Challenge Cup" Extracurricular Science and Technology Competition for College Students, the China College Student Computer Design Contest and other disciplines and science and technology competitions, and organize students to participate in teachers' scientific research projects.
- (d) Innovative evaluation methods. First, explore the application of non-standardized tests in classroom assessment. Second, students' participation in extracurricular scientific and technological activities such as discipline competitions and innovative experimental projects will be included in the scope of assessment and included in talent training credits. Third, students participating in enterprise training should be subject to school-enterprise joint assessment and included in talent training credits.

#### (iv) *Typical Cases*

Summarize the achievements of the reform, reflect on the problems that arise in the reform, improve the reform strategies and programs, and form a series of typical reform cases such as professional training target cases, curriculum teaching cases, practical teaching cases, innovation and entrepreneurship cases, and industry-education integration cases, so as to provide valuable experience for similar colleges and universities.

- (2) The methods to solve the problem include: investigation and research, design innovation, practical evidence, and case research and development.

## IV. INNOVATIONS AND EXPEDTED RESULTS

### (1) *Innovation*

Talent training system innovation: Based on the development needs of the times under the background of artificial intelligence, we will systematically build a high-level and application-oriented talent training system for information and computing science.

Implement reform plan innovation: Implement the talent training reform plan in multiple dimensions, highlight the teaching method of students' subjectivity, expand the role of classroom teaching in cultivating students' innovative thinking and practical ability, and form a process-oriented, personalized and diversified evaluation mechanism.

Innovation of reform achievements: Produce a series of typical cases and papers on talent training, promote the effectiveness of reform, and realize the sustainable development of high-level applied talent training in applied undergraduate information and computing science.

### (2) *Expected Effect*

This study will construct the training model, talent training system and talent training mode reform strategy and implementation plan of high-level applied applied science majors in applied undergraduate colleges and universities under the background of artificial intelligence, and produce excellent typical cases and teaching and

research papers, so as to provide favorable support for the reform of information and computing science professional talent training and provide useful reference for the reform of talent training mode in similar universities.

## V. SCOPE OF IMPLEMENTATION AND VALUE OF APPLICATION AND PROMOTION

### (1) *Scope of Implementation*

The research results of this study will be applied to the training process of information and computing science professionals in applied undergraduate universities, and after the experiment is basically qualified, it will be promoted to other related majors such as information science and technology, artificial intelligence, etc., so as to improve the quality of training related professionals.

### (2) *Value of Application and Promotion*

This study has distinctive characteristics of talent training in application-oriented undergraduate colleges in the era of artificial intelligence, highlights the training trend of the application of the curriculum system of information and computing science, the integration of practical education, and the popularization of innovative education, which has a beneficial demonstration and reference value for the cultivation of similar professionals in the province, and plays a positive role in promoting the reform of application-oriented undergraduate major higher education in local universities in our province.

The talent training system and cases constructed in this study can be implemented in relevant engineering majors in the province, which has a useful demonstration and reference value for the cultivation of similar professionals in the province, and plays a positive role in promoting the reform of higher education of application-oriented undergraduate majors in local colleges and universities in our province. In addition, the research results can be extended to the training and teaching of other professionals, with strong scalability, flexible construction of curriculum system according to the characteristics of the major, and innovative teaching mode, which has strong practical application value.

## VI. SUMMARY

In the context of the rapid development of artificial intelligence, all walks of life have been further developed, the demand for professional talents has increased, and at the same time, higher requirements have been put forward for the training mode of university talents. Colleges and universities should keep up with the needs of social development, reform the talent training model, strive to cultivate students' independent innovation ability and pioneering consciousness, stimulate their enthusiasm, expand their professional ability, and cultivate more comprehensive application-oriented talents for the society.

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