

Research on the Curriculum Reform of Computer Application Technology in the New Engineering Education Model under the Background of Artificial Intelligence

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Abstract: With the rapid development and wide application of artificial intelligence technology, the society has put forward higher requirements for public security talents with high information and intelligent literacy. As an important base for training future police elites, the teaching reform of computer application technology specialty in public security colleges is particularly important. Under the background of artificial intelligence, this paper deeply discusses the curriculum reform strategy of computer application technology specialty in public security colleges based on the new engineering education mode, and analyzes the application of these reforms in public security work, aiming at improving students' practical ability and innovation ability, and cultivating public security information technology talents to meet the needs of artificial intelligence era. This study not only provides theoretical basis and practical guidance for the curriculum reform of computer application technology specialty in public security colleges, but also contributes new ideas and methods to cultivate public security talents to meet the needs of artificial intelligence era.

Keywords: Artificial Intelligence; New Engineering Education Model; Public Security Colleges; Computer Application Technology Major; Curriculum Reform

1. Introduction

In recent years, the rapid development of artificial intelligence technology has profoundly influenced various fields of society. As an important base for cultivating public security information technology talents, public security colleges must keep up with the pace of the times and actively carry out educational and teaching reforms. This reform aims to

cultivate high-quality public security technical talents who possess both solid theoretical foundations and innovative thinking and practical abilities, in order to cope with increasingly complex social security challenges and intelligent policing needs. The new engineering education model emphasizes the cultivation of interdisciplinary integration, practical ability, and innovation and entrepreneurship ability, providing new ideas for the curriculum reform of computer application technology majors in public security colleges.

2. Current Situation of Computer Course Teaching in Public Security Colleges and Universities

2.1 The Teaching Content Is Outdated and Dull

The computer course teaching in public security colleges involves a lot of basic knowledge and complex operational content. However, current teaching content often lags behind technological development and is disconnected from practical experience. Students have little knowledge of public security information systems in practice, making it difficult for them to adapt to the actual needs of future work; Some problems and deficiencies in teaching not only affect students' information technology level, but also restrict students' development in their career.[1] In addition, the single teaching method leads to students lacking interest in learning and practical abilities.

2.2 Weak Practical Teaching

There are obvious shortcomings in practical teaching in public security colleges and universities. Traditional practical teaching mainly includes in class experiments, course design, etc., but these contents often lack

challenge and are difficult to cultivate students' engineering practice ability and innovation ability. In addition, many teachers lack practical experience, mostly from computer majors in ordinary universities, lacking training and experience at the grassroots level, and have insufficient understanding of the application of computers in practical work. This makes it difficult for teachers to combine specific work practices in teaching, resulting in a significant gap between teaching content and practical needs.

2.3 Single Teaching Evaluation

As an important part of curriculum construction, curriculum assessment plays an important role in assessment teaching. The key role of learning effect and students' learning achievement. At present, the evaluation indicators for computer science courses are single, focusing too much on the results of student performance and neglecting the examination of the formation process of students' thinking ability and problem-solving ability. This leads to the inability of teaching evaluation to comprehensively reflect students' learning situation and ability level, and to provide effective feedback for teaching reform.

2.4 Insufficient Cooperation between Industry, Academia, and Research

The cooperation between universities and enterprises is not close enough, resulting in a disconnect between teaching content and actual needs of enterprises, making it difficult for students to adapt to the actual needs of work after graduation.

3. Overview of the New Engineering Education Model

Public security colleges and universities bear the important mission of training police talents. Under the new situation, the demand for intelligent police talents is more prominent. From the perspective of talent training, how to reserve excellent police services to combat the increasingly high incidence of cyber crimes is an urgent proposition for public security colleges and universities. The "new engineering" strategy put forward by the Ministry of Education just points out the direction for this. [2] Education authorities, educational circles and business circles have

pointed out that "autonomous learning, teamwork, integration and innovation" has not only become an important indicator to measure the comprehensive quality of engineering talents, but also the core ability for students to use professional knowledge to solve problems and pursue innovation through cross-border integration. [3]

The new engineering education model is a future oriented and practical engineering education model aimed at cultivating engineering and technical talents with interdisciplinary knowledge, innovation ability, and practical ability. This model emphasizes the combination of theory and practice, focusing on cultivating students' problem-solving ability, teamwork ability, and innovative thinking.

(1) Interdisciplinary integration: Breaking through the barriers between disciplines in traditional engineering education, emphasizing the intersection and integration of different disciplines.

(2) Practical teaching: Students will be exposed to real engineering problems in the course and solve them through practical activities.

(3) Cultivation of innovation and entrepreneurship abilities: Students will learn about the challenges and opportunities in the process of innovation and entrepreneurship through innovative projects and entrepreneurial practices.

(4) Teamwork: Encourage students to engage in teamwork and focus on cultivating their teamwork skills.

(5) Global perspective: Focus on students' engineering cases and experiences on a global scale, and cultivate their ability for international communication and cooperation.

4. Reform Strategies for Computer Application Technology Courses Based on the New Engineering Education Model under the Background of Artificial Intelligence

4.1 Optimize the Curriculum System and Strengthen Professional Characteristics

The rapid rise of artificial intelligence and new technologies has put forward higher requirements for the talent cultivation of computer science and technology majors, and the supporting curriculum system should also be updated in a timely manner. Generally

divided into three levels, as shown in Table 1:

Table 1. Level of Curriculum System for Computer Science and Technology Major

Level 1: Public basic courses in science and engineering	Level 2: Technical courses in computer science and technology	The third level: courses in intelligent science and professional technology
such as political theory, advanced mathematics, university physics, circuits, etc.	such as computer language teaching, data structures, databases, compilation, operating systems, etc.	such as cognitive science, artificial intelligence, intelligent information processing, pattern recognition, etc.

As shown in the table, curriculum reform should keep pace with the times, introduce advanced technological content, add characteristic courses, and improve the construction of the teaching system. Based on the development trend of artificial intelligence technology and the actual needs of work, optimize the curriculum system: add courses related to artificial intelligence, such as cutting-edge courses such as artificial intelligence principles, machine learning, deep learning, etc., to enable students to master the basic theories and key technologies of artificial intelligence; Strengthen practical activities: increase the proportion of experimental courses and practical projects, and enhance students' practical application abilities through project-based learning, case analysis, and other methods; Interdisciplinary integration, strengthening the cross integration of computer science and technology, law, public security and other disciplines, cultivating students' interdisciplinary thinking and comprehensive abilities.

4.2 Reforming Teaching Methods to Enhance Teaching Effectiveness

In response to the problems existing in traditional teaching methods, emphasis should be placed on highlighting the practical application of work in the teaching process, and combined with the characteristics of computer basic teaching, to make the teaching content more in line with the practical needs of work. In teaching reform, innovative teaching methods should be used:

4.2.1 Implementation of case teaching

Showcasing practical application cases of computer technology through multimedia means, utilizing the public security information network to conduct interactive teaching and stimulate students' interest; Using case teaching method, by introducing real public security cases, students can learn and master computer knowledge in the process of solving practical problems. Encourage students to participate in case analysis and discussion, and cultivate their problem-solving and teamwork abilities.

4.2.2 Building a blended learning model that combines online and offline teaching

Utilize online platforms such as Chaoxing and Rain Classroom to construct a blended learning model that combines online and offline teaching. Before class, students watch teaching videos and reading materials released by the teacher to learn new knowledge independently and record difficult points; In class, teachers focus on problems, answer questions and clarify doubts, while students combine problem-based learning, collaborative learning, and self-directed collaborative exploration to complete the learning of knowledge content; After class, students will review online resources in a targeted manner to consolidate their learning outcomes. This teaching model places more emphasis on students' participation in the learning process, making them the main body of learning and enhancing their subjective initiative in learning.

4.2.3 Adopting the teaching strategy of "project development as the main line"

Project-based teaching takes solving practical problems as its core purpose, and integrates key knowledge points of teaching content into practical projects. In the teaching process, the teaching strategy of "taking project development as the main line and cultivating 'knowledge goals' and 'ability goals' as the dual wings" is adopted. Cleverly integrating various knowledge and skill points into the project, allowing students to develop and practice around specific public security business needs, consolidating relevant knowledge points while completing the project, and exercising and improving teamwork and problem-solving abilities. This method avoids the isolation, fragmentation, lack of continuity, and overall coherence of knowledge points, making the

transition of teaching content more natural and the connection more tight. Cross semester comprehensive projects can also be designed to allow students to conduct in-depth research and practice around practical problems. Through project presentations, defenses, and other methods, students can develop their teamwork, communication, and expression abilities, and improve their overall quality.

In project-based open learning, virtual simulation experiments are sometimes conducted to construct experimental environments using virtual simulation technology, allowing students to conduct experimental operations under safe and controllable conditions, improving experimental effectiveness and learning experience; Introducing virtual reality (VR) and augmented reality (AR) technologies to provide students with a more intuitive and vivid learning experience; By simulating real-life scenarios and cases, help students better understand and apply the knowledge they have learned.

4.3 Build a "One Body; Two Wings" Practical Teaching Framework; Highlighting the Cultivation of Practical Application Ability

In response to the shortcomings of traditional curriculum teaching, such as insufficient theoretical connection with practice and insufficient cultivation of practical application ability, reform should be carried out from multiple aspects, including updating teaching concepts, reforming teaching modes and organizational forms, adjusting and innovating practical teaching content. Based on the background of "artificial intelligence+ new engineering", construct a practical teaching architecture based on "one body, two wings". Among them, "one body" represents the new concept, new direction, new requirements, new theories, new technologies, and new achievements that integrate "new engineering" and "artificial intelligence" into the main content of practical teaching in the field of computer application technology as the axis, and "two wings" as the main body of practical teaching. By integrating "new elements", adjusting and optimizing the main content of traditional practical teaching, and establishing a "1+2+1" hierarchical modular practical teaching new system. See Table 2:

Table 2. A New System of "1+2+1" Step-By-Step Modular Practical Teaching

1: Basic Practice Teaching Module	2: New Engineering and Artificial Intelligence Practice Teaching Module		1: Comprehensive practical teaching module
	New Engineering Practice Teaching Module	Artificial Intelligence Practice Teaching Module	

As shown in the table, the first "1": Basic Practice Teaching Module

Objective: To strengthen students' basic knowledge and skills in computer science.

Content: Practical teaching of core courses including computer programming languages (such as Python, Java), data structures, algorithm design, operating system principles, computer networks, etc.

Characteristics: Emphasize the combination of theory and practice, deepen students' understanding of professional knowledge through laboratory operations, project training, and other methods, and lay a solid foundation for subsequent learning.

2: New engineering and artificial intelligence practice teaching module

New Engineering practice teaching module:

Objective: To cultivate students' innovative thinking, engineering practice ability, and interdisciplinary integration ability.

Content: Introduce the concepts and methods of new engineering disciplines, such as Internet of Things technology, big data analysis, cloud computing platform applications, etc. Through project-based learning, teamwork, and other methods, students can learn and grow while solving practical problems.

Characteristics: Emphasize interdisciplinary integration and encourage students to explore the application of new technologies and methods in public security work.

Artificial intelligence practice teaching module:

Objective: To master the basic theories, algorithms, and application technologies of artificial intelligence.

Content: Covering cutting-edge fields such as machine learning, deep learning, natural language processing, computer vision, etc., enhancing students' AI application abilities through case analysis, laboratory projects,

competition participation, and other methods.

Characteristics: Closely integrating with the practical needs of public security, exploring the application of artificial intelligence technology in crime prevention, intelligence analysis, investigation and case solving.

The second "1": Comprehensive practical teaching module

Objective: To cultivate students' comprehensive application ability, innovation ability, and teamwork spirit.

Content: Based on practical problems in public security work, design comprehensive practical teaching projects, such as the development of intelligent monitoring systems, the construction of big data analysis platforms, and the design of network security protection systems.

Characteristics: Emphasize project driven approach, encourage students to apply their learned knowledge comprehensively, solve practical problems, and focus on cultivating teamwork and project management skills.

The "1+2+1" hierarchical modular practical teaching new system combines basic practical teaching, new engineering and artificial intelligence practical teaching, and comprehensive practical teaching in a phased and modular manner, forming a practical teaching system that emphasizes both foundation and innovation. This system not only helps to enhance students' comprehensive quality and innovation ability, but also better adapts to the needs of public security work under the background of "artificial intelligence+ new engineering", providing new ideas and methods for the reform of computer application technology courses in public security colleges.

4.4 Improve the Teaching Evaluation System and Promote Continuous Improvement

4.4.1 Establish a diversified evaluation system: Curriculum assessment is an effective way and an important means to test students' mastery of knowledge, which plays an important guiding role in students' learning and teachers' teaching, and is one of the core parts of curriculum teaching reform. [4] In addition to traditional exam scores, add evaluations in project reports, practical achievements, team collaboration, and other aspects, and establish a diversified evaluation system that includes regular grades,

final exam scores, practical operation scores, project scores, etc. Through a diversified evaluation system, students' learning outcomes and comprehensive abilities are comprehensively and objectively evaluated, promoting their all-round development.

4.4.2 Introduction of third-party evaluation: Invite industry experts, business representatives, and other third parties to evaluate the quality of teaching and students' learning outcomes. Through third-party evaluation, obtain more objective and fair evaluation results, and provide strong support for teaching improvement.

4.4.3 Establish feedback mechanism: Establish a comprehensive teaching feedback mechanism and promptly collect opinions and suggestions from students and teachers. Based on feedback, continuously adjust and optimize teaching content, teaching methods, and evaluation systems to promote the continuous improvement of teaching quality.

In summary, measures such as optimizing the curriculum system, reforming teaching methods, strengthening practical teaching, and improving the teaching evaluation system can effectively enhance the quality and effectiveness of computer course teaching in public security colleges, and cultivate computer application technology talents that meet the practical needs of public security. Establish a diversified teaching evaluation system that not only focuses on students' academic performance, but also emphasizes the assessment of their thinking and problem-solving abilities during the formation process.

4.5 Enhance the Quality of the Teaching Staff and Strengthen Practical Teaching Abilities

4.5.1 Strengthen teacher training and communication: Regularly organize teachers to participate in domestic and international academic conferences and training activities to enhance their professional competence and teaching ability. Strengthen teachers' practical experience in public security and computer professional knowledge training, and enhance their professional abilities and teaching level. Encourage teachers to conduct research and training at the grassroots level of public security, understand the actual needs of public security organs for computer knowledge and

skills, and transform these needs into the driving force and source of curriculum reform.

4.5.2 Introduction of practical experts: Invite public security experts and technical personnel with rich practical experience to serve as guest professors or part-time teachers, providing students with the latest practical experience and guidance. Establish a mechanism for industry university research cooperation, collaborate with enterprises to carry out practical teaching and research projects, and enhance teachers' practical abilities and research level. Industry university research cooperation is an effective way to improve the teaching quality of computer application technology majors in public security colleges. Through deep cooperation with enterprises and research institutions, resource sharing and complementary advantages can be achieved, jointly promoting talent cultivation and technological innovation.

5. Application of Reform Measures in Practical Work

With the rapid development of computer technology and the intensification of technical distortion, [5] the number of cybercrime cases continues to rise. It is necessary to make full use of advanced security technology, big data and artificial intelligence technology to build a three-dimensional and information-based social security prevention and control system. [6] Public security colleges bear the important mission of cultivating police talents. Therefore, cultivating the ability to solve problems comprehensively by means of public security informationization has become an important part of the teaching process of public security professionals. [7] The curriculum reform emphasizes the close combination of theory and practice. By updating the course content and introducing cutting-edge technologies such as artificial intelligence and big data analysis, students are exposed to the cutting-edge technical knowledge in public security work. At the same time, strengthen practical links, such as experiments, training and project driving, so that students can apply what they have learned in simulated or real police scenes. This mode of "learning by doing, learning by doing" has laid a solid foundation for students to adapt to police work quickly after graduation.

Students in public security colleges have a

clear career direction, and the teaching work in public security colleges should adhere to the concept of "all for actual combat and all for actual combat". [8] Curriculum reform measures are aimed at improving the technical ability and innovative thinking of students in public security colleges, and its essence is to transform these reform achievements into actual combat effectiveness in public security work. Technological innovation leads practical application. The application of curriculum reform measures of computer application technology specialty in public security colleges in actual public security work not only embodies the deep integration of theory and practice, but also leads the upgrading of practical application through technological innovation.

5.1 Intelligent Monitoring and Early Warning System

Through the curriculum reform, students have mastered the application of artificial intelligence technology in monitoring video analysis, and can apply and even develop intelligent monitoring and early warning systems. The system can automatically identify abnormal behaviors (such as fighting, theft, invasion, etc.) and give an alarm in time, which greatly improves the efficiency and accuracy of public security work. For example, deploying the system in shopping malls, stations, banks and other key areas can monitor the flow of people and abnormal situations in real time and provide timely and effective information support for public security departments.

5.2 Face Recognition and Comparison Technology

The curriculum reform also emphasizes the cultivation of students' face recognition and comparison skills. In actual public security work, this technology is widely used in tracking and arresting criminal suspects. By comparing the face information in the surveillance video of public places with the information in the database, we can quickly lock the suspect and provide strong support for the detection of the case.

5.3 Unmanned Patrol Car

Combined with the new concept of engineering education, the teaching of

driverless technology is introduced into the curriculum reform. Students understand and master the development and application technology of unmanned patrol cars, which can drive autonomously in complex environment, patrol at fixed points and give an alarm for abnormal situations. For example, unmanned patrol cars can be used in daily patrol work, which will improve the efficiency of police work in grass-roots police stations.

5.4 Data Analysis and Intelligence Judgment

The curriculum reform also emphasizes strengthening the cultivation of students' data analysis ability. Students understand and then master how to use artificial intelligence technology to automatically analyze and process a large amount of intelligence information (including text, images, audio, etc.). In the actual public security work, these technologies are widely used in combing and correlation analysis of case clues, helping the police to quickly locate criminal networks, find out the criminal chain, and provide strong support for case detection.

6. Conclusion

In the context of artificial intelligence, the reform of computer application technology courses in public security colleges under the new engineering education model is a systematic project that must keep up with the pace of the times, continuously update course content, optimize course systems, innovate teaching methods, and strengthen the cultivation of industry university research practical application abilities. These reform measures not only improve students' comprehensive quality and innovation ability, but also pave the way for their future career development, and provide strong talent and technical support for the modernization and intelligent transformation of public security work. In the future, with the continuous development of artificial intelligence technology, public security colleges will continue to deepen curriculum reform, strengthen cooperation with enterprises, and make greater contributions to cultivating more outstanding public security talents that meet the needs of the artificial intelligence era.

Acknowledgments

This paper is one of the achievements of the cooperative education project of Industry-University, Ministry of Education, "Research on the Curriculum Reform of Computer Application Technology Specialty Based on the New Engineering Education Mode in Public Security Colleges under the Background of Artificial Intelligence (231003221172319)".

References

- [1] Chen Chao, Zhou Shengli, research on the teaching reform of computer basic courses in public security colleges-taking the course of "Network and Informatization Basis" as an example. *Forest Public Security*, 2024 (02), 41
- [2] Sheng Mengmeng, the practice and thinking of SPOC project teaching mode under the background of new engineering-taking Python programming course as an example. *Journal of Public Security-Journal of Zhejiang Police College*, 2020(03), 99.
- [3] Gao Song, the implementation of the "New Engineering F Plan" to train leading talents in engineering. *Higher Engineering Education Research*, 2019 (4): 19-25.
- [4] Ren Wenhua, Chen Chao, exploration and research on the teaching reform of database series courses in public security colleges — Taking Zhejiang Police College as an example, *Journal of Guangxi Police College*.2016 ,29 (03), 101
- [5] Yu Zhigang. Intergenerational Evolution, Criminal Law Sample and Theoretical Contribution of Cybercrime in China. *Law Forum*, 2019 (2): 5-15.
- [6] Jin Gaofeng, Shou Jiali, Lin Yinan. Analysis and Prediction of the Crime Situation in China (2018-2019). *Journal of Chinese People's Public Security University (Social Science Edition)*, 2019 (3): 1-11.
- [7] Liu Ling, Tan Aimin, Research on Teaching Reform of Basic Computer Courses in Public Security Colleges Based on Big Data Background. *Journal of Yunnan Police College*, 2022 (06), 50.
- [8] Ren Keqin. Rethinking about actual combat teaching in public security colleges. *Public security education*, 2018 (9): 61-67.