Teaching Reform of Network Security & Law Enforcement Major in Police Higher Education

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Abstract—As a newly arisen and interdisciplinary major, currently existing theories teaching method in network security & law enforcement major is not good enough to meet the needs for police personnel training. The primary objective of this study is to present a modular, integrated approach to towards teaching reform for the major of network security & law enforcement. The knowledge modules based on industry requirements are constructed firstly, then the modular teaching mode in course teaching is adopted and the process assessment method is used to mobilize students to learn actively and improve teaching effectiveness. To verify this teaching approach, the Principle and Application of Database course is practiced into the juniors of network security & law enforcement major of Hubei University of Police. The results show the reform can improve students' professional skill and comprehensive quality, thus the good teaching effect is realized.

Keywords—Teaching reform; public security education; process assessment; modular teaching

I. INTRODUCTION

In October 1983, the ministry of public security set up the computer administration and supervision bureau to guide, supervise and inspect national computer safety work. In 1998, a number of provincial and municipal public security organs established the professional teams to administer the security management of public information networks, and coordinate and guide the basic public security network security work. In 2008, a number of basic public security organs set up organizations and form professional network policemen teams, which is responsible for maintaining network order, monitoring the internet and striking cybercrime, etc.

The dynamism of professional development comes from the social needs, and the value judgement of professional development is the foundation of setting majors, which can be viewed as a kind of organization form of cultivating directional personnel[1]. The formation of the network policemen as a profession is the result of maintaining the safety and order of network space security, which also becomes the value judgement of setting network security & law enforcement major.

In 2012, The network security & law enforcement major was set up according to "the Undergraduate Specialty Catalogue of Higher Institutions (2012)" by the Ministry of Education, which was added in public security technology subject[2]. After the approval of the Ministry of Education, Criminal Investigation Police University of China and Nanjing Forest Police College set up network security & law enforcement education degree, a four-year school system in 2013. Thereafter, approval of the Ministry of Education, the majority of the provincial police colleges were allowed to set up this major and started to enroll students.

The history of network security & law enforcement undergraduate major is not long and it just has a large-scale development, and some deep problems still remain in the major construction which is needed to be analyzed and solved properly. The rest of this paper is organized as follows. In Section II, the authors introduce the research background and motivation. The design of teaching reform of network security & law enforcement major, and the implementation of course teaching are detailed in Section III. Teaching effectiveness and conclusions are covered in Sections IV and V respectively.

II. RESEARCH BACKGROUND AND MOTIVATION

As a newly arisen and interdisciplinary major, the most important characteristic is the compound features of knowledge system, which involved the integration of much knowledge and the cross of multi-disciplinary. It covers the subject knowledge of computer, law, management, etc. and fuses the sociology and public security subject knowledge. Any single subject knowledge is not enough to fulfill the task of training talents.

The skill features of practice request are another main characteristic in this major. After studying at the police colleges, the students should have the capacity of cybercrime investigation, electronic evidence forensics and analysis, internet governance, supervision and guildance of network public sentiment, and the ways and methods of the governance of cyberspace, network security incident response, etc. Those kinds of capacity and methods are not easily accessible by purely imparting theory knowledge[3].

Generaly, the major is a group forms the courses, that is to say, the course system determines the quality level of talent training and the ability of comprehensive technology application. But in the actual teaching, according to our survey, it exists following problems.

Firstly, the course system constructed by the subject knowledge system pays attention to theories, and makes light of practice, which weakens practical skill training for students.

The course contents and the instructional design incline disciplinary, and do not connect closely with the practical activities of public security work.

Secondly the school source of the provincial police colleges mainly comes from the home provinces, and the students may have a job lined up after graduation. The students lack the autonomy and self-discipline of student learning, and have poor study habits. Thirdly, for the teachers, with more teaching contents and limited time allocation, they find it hard to accomplish the teaching task in the limited time, and the students often lose interests in learning in class.

To our best knowledge, the traditional form of course teaching is currently adopted by most police colleges in china. Traditional teaching model is that the teacher is center, which includes teacher's lecturing in class instead of students' self reading and self exploration, adopting final assessment characterized by paper-and-pencil test, etc. The teaching model has not met the requirements that the police work requires high-quality applied professionals educated by the police colleges.

III. TEACHING DESIGN AND IMPLEMENTATION

A. Design Thought

1) Knowledge modules construction based on industry requirements: The police education in the provincial police colleges belongs to a higher education level, but the police vocation-oriented is its essential character, which need to explore and establish the training objective for talents by encircling the police industry requirement for talents' knowledge, capability and quality[4].

Firstly, we should survey the industry jobs and analyze the job requirements of the public security organs, and then extract the knowledge points and the skills required to fill those jobs. Secondly, combine the extracted skills required with the theory knowledge according to the arrangement for knwoledge systematic nature, and construct knowledge modules the students need to learn.

2) Course implementation with modular teaching mode: A modular education is becoming more common given the relevance of interdisciplinary and personality-oriented approaches. A module is a universal structure with similar tangible characteristics including teaching content and teaching methods, which are always tailored to teaching objectives but with emphasis on different learning outcomes. Each module should have its own course ware and that enable development of knowledge, skills and abilities prescribed by program outcomes[5].

In our design, one is to round the knowledge modules needed by the students, combines professional theory with operating skills, and adopt the integration of teaching. During transferring professional theory knowledge, it focus on the systematicity and discipline of the theory knowledge, while during the training of operating skill, it emphasize the practicability of professional skills training by pertinently designing and arranging the experiment content close to the practice of public security work. The other is to select different teaching methods in different teaching modules, according to different knowledge contents and learning requirements.

3) Course assessment with process assessment method: Which the teacher's presentation is the main part of the class and the students' achievements are tested by a paper at the end of the semester, can not achieve promoting learning and teaching effects, and some teaching methods of the flipped classroom and formative assessment are applied to improve classroom teaching quality[6]. Based on above research, the courses for this major involve wide knowledge, limited teaching time, applied talents training for the police work,etc., any single teaching method cannot achieve famous teaching result, and the process assessment, which references the virtues of the flipped classroom and formative assessment is applied[7].

Applying process assessment method can cultivate the autonomous learning ability of students and improve the quality of talent training. In the process assessment method, the teachers provide supplement materials of each course module for the students and distribute the assessments into the learning procedures, and then give the timely feedback and evaluation after examining the students' self-study results in the classroom.

B. Teaching Implementation

Supported by the teaching reform project of Hubei University of Police "practice and innovation of the talents training patterns in network security & law enforcement major based on collaborative innovation idea and requirements for actual combat", we linked to actual combat of in practical public security departments and optimized the course system, and strengthened the era, pertinence and adaptability of teaching contents. Due to space limitations, in this paper, "Principle and Application of Database", for example, discusses course teaching implementation.

1) Knowledge module Design: Specific measures as follows: survey closely related police's sort and analyze the corresponding responsibility, refine technical skills and capability requirement related to the database course, and combine it with course knowledge system according to the arrangement of knowledge systematic nature, design the knowledge moule of database course, as shown in Fig. 1.
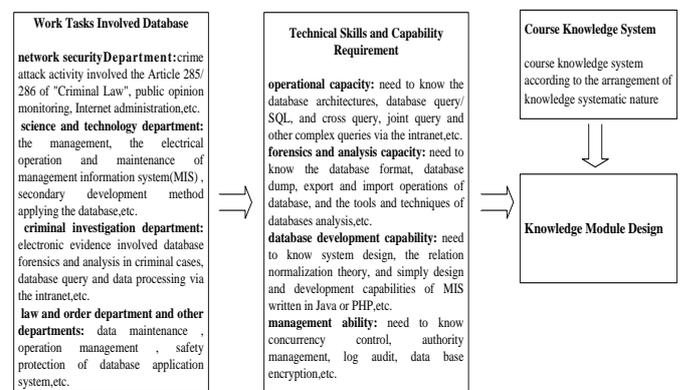

Fig. 1. The build process of knowledge module

2) Modular teaching mode application: The course is divided into several modules, including basic theory module, design module, management module, application module. Each course module, as shown in Table I below, contains the teaching content description of the module and its corresponding teching methods.

TABLE I.   USING MODULAR TEACHING MODE

Teaching Module	Teaching Content	Teaching Methods
Basic theory module	Architecture, SQL, Database integrity,etc.(theory knowledge)	Lecture method, Q&A method demonstration method,
	Query operations of MIS,ect.(skill operation)	
Design module	Relation normalization theory, ODBC, etc. (theory knowledge)	Self-study and cooperation study methods, task-driven method
	Development and design of database application system(skill operation)	
Management module	Concurrency, backup, recovery of database,etc. (theory knowledge)	Lecture method, Q&A method,demonstration method, classroom disscussion
	set the permission, sessions concurrency setting, backup operation,etc. (skill operation)	
Technology application module	forensic analysis of database(skill training)	Case teaching method, on-the-spot teaching method ,group discussion,
	Database system safety and maintenance(skill training)	
Case analysis module	some real-life case studies in public security work(comprehensive training)	Case teaching method,etc.

3) Process assessment methods design: Each course module will target one of more of the five the course learning outcomes as shown in the table II. To evaluate the learning outcomes, lots of assessment methods are applied, such as oral presentation, practice demonstration, report writing, group discussion, etc. The assessment method is given according to different course module and different learning outcomes, as shown in table III. The teachers will give each student's overall evaluations of learning effect, diagnose their learning problems, and improve their shortcomings according to the feedback information and data analysis provided by the process assessment.

TABLE II.   THE FIVE COURSE LEARNING OUTCOMES

Num	Ability	Brief Description
1	Speaking ability	Describe database forensics process necessary for ensuring the admissibility of evidence in court, and designing idea and developing method of database
2	Writing ability	Write a formal database forensics report, and databse design documents
3	Skills operation ability	Add, delete, change and search data of database, use court-approved forensics tools to retrieve and analyze admissible data of database, take backups, set up access to the database,etc.
4	Collaboration &communicative ability	Communicate and work as a group for the projects, tasks, etc.
5	Innovation ability	Apply what the students have learned to solve problems related to the practice of public security work. For example, Apply emerging technologies to identify and analyze admissible evidence, etc.

TABLE III.   THE ASSESSMENT METHODS

Num	Teaching contents	Learning outcomes	Assessment methods	Percentage of scores
1	Basic theory module	1,3	Oral presentation, practice demonstration	15%
2	Design module	1,2,4	Report writing, group discussion, MIS system demonstration	20%
3	Management module	1,2,3	Oral presentation, practice demonstration, report writing	15%
4	Technology application module	1,2,3,4	Group discussion, simulation operation, oral presentation, practice demonstration	25%
5	Case analysis module	1,2,3,4,5	Online examination (comprehensive training based on the actual case in public security work)	25%

IV.   TEACHING EFFECTIVENESS

A. Optimizes Course Knowledge Structure

Currently the course system construction is more concerned about the subject system and used to adopt subject knowledge-based model to transfer theory knowledge to students, focus less on interdisciplinary nature and practicality of the course.

In our teaching practice, the design of teaching contents is more close to the practice of public security work, and the basic theories and methods combine with cultivation of the operative skill for each course module. The students can understand the future job requirements by studying the theory knowledge and the corresponding skill operations, which reduces the gap between the applied professionals educated by the police colleges and the need of talent of public security organs.

B. Cultivate Students' good Study Habits

Before the implementation of the teaching reform, the teaching mode is teacher-centered. The teachers teached in class exhaustedly and assigned homework, the students listened to the teacher passively, taken notes, did some exercises, and prepared final assessment characterized by paper-and-pencil test, which made them tired of learning.

During the teaching process, the evaluation for learning results take students' attitude, performance and participating depth as standards, which urge students to use the educational resources to learn actively outside the classroom. The students enter into the classroom with problems, and participate in classroom discussions than they used to, etc. To a certain extent, it arouses fully students' study enthusiasm, which enables students to be the study main body, and makes full use of students' subjective initiative of problems solving.

C. Analyze Scientifically the Constitution of the Score

For the teacher, analyzing the constitution of the score is more scientific. For a student, the total score is composed of

the score picked up from each course module; we can analyze quantitatively the constitution of the score by quantitative analysis of the knowledge module. For example, there exists student A, student B, student C, the first students' total score is 86, while the last two student's score is 70, but there are differences between the composition of the last two students' total score, and the score picked up from some knowledge modules of the last two students outscores the first students' score, as shown in Fig.2.
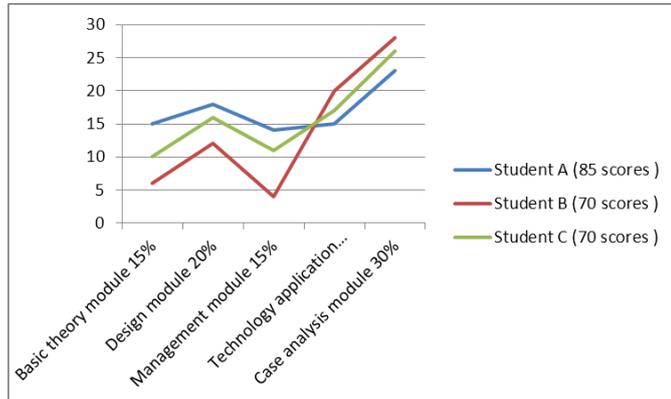
Fig. 2.   The score analysis of student individual

We also find that there are also differences in mastery condition of every part of knowledge module. In comprehensive applied ability, student B is better than the student A and student C, as shown in Fig.3.
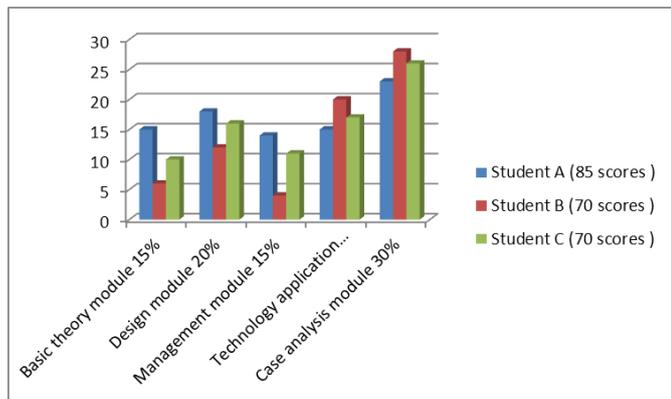

Fig. 3.   The score analysis of student individual

V.   CONCLUSIONS

Though the teaching reform achieves good teaching results by the teaching practice, there are still some obvious problems. One problem is that it is a higher standard and challenge to the teachers. the teachers must get familiar with course content and grasp how to use database knowledge and methods to solve practical problems of public security work creatively, design the course knowledge modules and reasonable assessment, use the timely feedback information to modify their teaching plan,

and need to focus on the latest technologies and make course to meet the developing needs of police's practical department. As a whole, higher standard and challenge put the teachers into an uncomfortable position.

Another problem is that the network teaching platform is insufficient. The students in the process of self-study are difficult to find some adapted learning resources during previewing link, and it lacks certain platform for the students to exercise after class, to exchange ideas with the teachers and students,etc., which will impact on student, especially their enthusiasm towards study.

Any other problem is that how to scientifically and rationally set up the course module and assessment form according to the discipline characteristic and the requirements of the cultivation of police talents still need to be studied. However, On the whole, knowledge modules construction based on industry requirements, modular teaching mode application, and process assessment methods design will have a far-reaching effect on the police education, an indispensable part in higher education.

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