

# Research on the Teaching and Reform of the Course “Pattern Recognition” Based on the Internet Environment in the Context of New Engineering Course

Fangfang Yang, Zhi Jiao, Zongrui Li, Yajing Liu\*

North China Institute of Aerospace Engineering,065000

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**Abstract:** Under the background of new engineering course, strong practical ability and strong innovation ability have become the new goals of college undergraduate talent training. With the development of teaching informatization, the use of Internet for online teaching has been paid more and more attention by universities. This paper is committed to reforming the traditional teaching method of “Pattern Recognition”, enabling students to obtain educational resources at will by using the Internet to get rid of the shackles of fixed classroom teaching, and transform traditional fixed education into flexible mobile education, so as to stimulate students’ interest in learning and improve the quality of classroom teaching.

**Keywords:** New engineering course; Teaching informatization; Mobile Internet; Mobile education

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## Fund Project:

Teaching and Research Project of North China Institute of Aerospace Engineering(JY202250);  
Industry-university Cooperative Education Project of Ministry of Education(201901063002).

Entering the 21 century, with the rise of big data, cloud computing, artificial intelligence and other industries, new engineering concepts came into being. Under the background of new engineering course, strong practical ability and strong innovation ability have become the new goals of college undergraduate talent training<sup>[1]</sup>. In this context, domestic universities have also begun to take pattern recognition as a compulsory course for undergraduates majoring in automation, computer science and technology, electronic information and other related majors.

Pattern recognition is a subject that closely combines theory and engineering practice. Due to the need for a broad theoretical foundation, compact course hours, and strong professional and technical content, under the traditional classroom teaching mode, most students encounter problems such as difficulty in understanding, poor hands-on ability, and poor learning effectiveness when learning the course. Therefore, in order to meet the requirements of new engineering course, the use of the Internet for online teaching has been paid more and more attention by universities<sup>[2]</sup>.

## 1. Current Teaching Status of “Pattern Recognition” Course

Pattern recognition is a required course of electronic information engineering in our school. In the traditional teaching process, the combination of theory and practice is mainly adopted, and the teacher imparts the theoretical knowledge to the students in the form of multimedia courseware. During the teaching of practice course, students operate computers, teachers guide them, and finally the experimental reports are completed.

## 2. Problems in Traditional Teaching Mode

Pattern recognition courses involve applied mathematics, natural science, engineering fundamentals and professional knowledge and other fields. And engineering is highly practical. Most students will find it difficult to learn and fail to achieve the learning objectives of the course<sup>[3]</sup>.

### 2.1 Problems of Classroom Teaching

In the process of classroom teaching, teachers allocate class hours according to the curriculum outline, but the classroom teaching time of pattern recognition course is limited, and students rely too much on the classroom teaching of teachers, and their understanding ability is uneven, and they only passively accept the knowledge instilled by teachers, do not think, do not actively seek help to solve problems, and lack the ability of independent learning. With the deepening of the teaching content, the difficulty of students learning courses will gradually increase, and students will gradually lose their interest in learning in the long run.

## **2.2 Problems students have in completing homework after class**

The learning of pattern recognition not only requires students to listen carefully in class, but also requires them to do more exercises after class to transform classroom knowledge into their own knowledge and learn to apply what they have learned<sup>[4]</sup>. However, the dull classroom teaching makes students' learning enthusiasm slacken. They only complete homework mechanically, do not want to think seriously and practice more, and are unwilling to actively use their spare time for independent learning.

## **2.3 Student experiment problems**

The experimental part of the pattern recognition course mainly focuses on students completing designated experimental tasks on the computer. Due to students' insufficient understanding of the teaching part in class and their lack of solid mastery of corresponding knowledge, it is difficult for them to independently complete experimental tasks, let alone make improvements and practical applications based on experimental tasks. Therefore, the experimental task did not achieve the true goal of empowering students with practical problem-solving abilities.

# **3. Reform and Exploration of Curriculum Teaching Mode**

## **3.1 Course syllabus revision**

The knowledge structure of the original syllabus for pattern recognition in our school is relatively loose, the key content is not prominent enough, the syllabus planning is more biased to theoretical teaching, more hours are allocated to class, and 1 hour is allocated to experiments. Course assessment mainly depends on the final exam, so that regular grades, experiments and homework in the syllabus accounts for 30%, while the final exam accounts for 70%. As a result, students pay too much attention to the final exam and neglect the usual classroom teaching.

According to the needs of teaching innovation, this paper revises the teaching syllabus:

3.1.1 Sort out course knowledge points, integrate fragmented knowledge, and mark important knowledge points;

3.1.2 Curriculum objectives correspond to graduation requirements index points, and reasonable arrangement of teaching content in class;

3.1.3 Reasonably adjust the experiment content, introduce real project cases, and adjust the difficulty of the experiment according to the course content and students' learning level, from easy to difficult, from simple to complex, so that students can accept it easily.

3.1.4 Adjust the proportion of course assessment, increase the proportion of regular grades, experiments and homework, and reduce the proportion of final exams.

## **3.2 Construction of network teaching platform**

We can use Chaoxing network teaching platform to establish pattern recognition course system:

3.2.1 We should establish a pattern recognition course resource library, and upload teaching materials such as videos, courseware, lesson plans and summaries in classroom teaching to the library in real time, so that students can obtain teaching resources in real time after class and solve puzzles in time.

3.2.2 We should make micro-courses to make key and difficult knowledge into micro-lessons and upload them to the learning nodes of the course. Students can freely choose knowledge points and courses that are not fully understood in classroom teaching according to their actual mastery and understanding ability.

3.2.3 We should establish a test bank to summarize the test questions of each unit into it, and send them to students in the way of homework, so as to realize the test along with learning and check the learning effect of students at any time.

3.2.4 We should establish a classic case base and upload some classic cases to the system. Students can carry out exercises after class through this module to enhance their programming ability.

The establishment of pattern recognition and application course system on the Chaoxing network teaching platform can fully compensate for the lack of teaching hours, and stimulate the enthusiasm of students to use the Internet platform for independent learning. In this way, students can learn key knowledge at any time, so that students can change from passive learning to active learning, so as to achieve the purpose of improving the overall teaching effect.

### 3.3 Construction of curriculum assessment system

The traditional assessment of pattern recognition is generally based on the final exam paper, and students often rely on the key points of the exam summarized by the teacher on the eve of the exam to make up for the theoretical knowledge temporarily, and the assessment results cannot truly reflect the students' actual mastery of the course. The course adopts a combination of online and offline methods to comprehensively evaluate students' learning results, as shown in Table 3-1:

Table 3-1 Mode recognition assessment reform

| The proportion of assessment results | Online                                     | Offline                        |
|--------------------------------------|--|--------------------------------|
| Regular grade(30%)                   | Homework(10%)<br>Learning after class(10%) | Classroom performance(10%)     |
| Experimental results(30%)            | Experimental projects(10%)                 | Team defense(20%)              |
| Final exam grade                     |  | Written examination grade(40%) |

This arrangement makes full use of the functions of the mobile Internet to improve the enthusiasm of students for independent learning, while enhancing the sense of teamwork, so that students can change from passive learning to active learning, and finally it can achieve the purpose of improving the overall teaching quality.

## 4. Teaching Result

The original teaching of pattern recognition makes students more passive and less active in learning. Most students stick to textbook knowledge in learning and applying knowledge, and cannot independently apply the knowledge they have learned to solve relevant practical problems. The achievement degree of the course goal of pattern recognition is only 60%-70%. After two cycles of experimental teaching, students' mastery of pattern recognition courses has been significantly improved, as shown in Table 4-1:

Table 4-1 Degree of achievement of pattern recognition course objectives

| Academic Year | Number of participants in class | Number of course objectives achieved | Number of course objectives not achieved | Degree of achievement of course objectives |
|---------------|---------------------------------|--------------------------------------|--|--|
| 2021          | 106                             | 92                                   | 14                                       | 86.79%                                     |
| 2022          | 69                              | 62                                   | 7  | 89.85%                                     |

The data in Table 4-1 shows that degree of achievement of students' course goals in pattern recognition has steadily improved.

In addition, the change of teaching mode, and making full use of the advantages of Internet teaching platform make students change from passive learning to active learning, significantly increase their interest in knowledge, and cooperate more closely with teachers in class, increase the interaction of course teaching, greatly increase the success rate of experiments, and improve the overall learning efficiency of students.

## 5. Conclusion

To sum up, in order to adapt to the new needs of talent training under the background of new engineering course, this paper tries to change the traditional teaching mode, makes full use of the advantages of the Internet teaching platform, explores from the four aspects of course outline, teaching content, experiment setup and assessment mechanism, changes the traditional teaching mode, makes students change from passive learning to active learning, and finally achieves the purpose of improving the overall teaching quality.

Practice has proved that such a teaching mode improves the interaction and initiative of teachers and students, not only improves the teaching quality, but also improves the practical ability of students, exercises the ability to combine theory with practice, analyze and solve problems, and exercises the engineering consciousness, and cultivates the innovation consciousness and innovation ability. Thus, students will become talents with a solid foundation, strong adaptability, and strong competitiveness, who meet the needs of society.

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