

# Exploration and practice of 《Data Structure and Algorithms》 based on Platform of Intercollegiate study

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## Abstract

**In order to realize the sharing of high-quality higher education resources, so that students can learn the courses of other colleges and universities without leaving school, Liaoning Province began to implement the practice of Cross College Credit in 2014. Shenyang Institute of technology, the user of 《Data Structure and Algorithms》, and Northeast University, the builder of the course, have implemented in-depth cooperation in cross university credit. In the process of project implementation, combined with the problems and improvement measures in the process of teaching implementation, in order to improve the teaching quality of the project implementation.**

## Keywords

**Intercollegiate Study; Data Structure and Algorithms; Reform in Education.**

## 1. Introduction

In May 2014, the Liaoning Provincial Department of Education issued the notice of Liaoning Provincial Department of education on carrying out the pilot work of cross school credits (Ljh [2014] No. 224) [1], encouraging colleges and universities in the region to jointly set up high-quality courses and promote the sharing of teachers, courses and credit mutual recognition. Cross School study and credit mutual recognition are new ways to realize resource sharing, which will also be the theme of future education model exploration. It helps to stimulate students' interest in learning, take courses they are interested in, and improve the quality of talent training.

The data structure and algorithm course of the software engineering major of the school of information and control of Shenyang Institute of Technology participated in the credit course of inter school study in Liaoning Province in the autumn of 2020, chose the data structure course of the Software Engineering Institute of the school of software of Northeastern University, and checked the relevant course resources through the superstar platform.

In the process of implementing this inter school learning curriculum model, teachers in pilot units generally use flipped classroom to replace the traditional curriculum teaching model. Students' learning of new knowledge is arranged after class, and they can obtain excellent course resources through the network for independent learning; In the classroom, teachers are responsible for organizing students to discuss and exchange knowledge learned after class, so as to further internalize knowledge [2]. Flipped classroom teaching mode has changed the single teaching mode based on Teachers' teaching into student-centered learning, which requires students to have higher learning initiative. However, we should see clearly the current situation of domestic students, that is, they are not good at asking questions and are not proactive, which directly affect the effect of flipped classroom.

## 2. The significance of the reform of the teaching mode of inter school study

Taking courses across colleges can realize the sharing of high-quality teaching resources among colleges and universities, especially high-quality laboratory resources, and alleviate the pressure of insufficient teachers and teaching equipment in Colleges and universities. Cross School study teaching can break through the inter school boundaries, improve the social sharing degree of high-quality teaching courses, solve the problem of decentralized curriculum resources in Colleges and universities, and provide effective methods to better improve the teaching quality of higher education. Course users (students) can learn the courses of other colleges and universities anytime and anywhere, not only learn the teaching content of courses of other colleges and universities, but also experience the teaching charm of different teachers. The Internet has changed the previously isolated state of education, making the educational participants and educational resources of the whole society form a whole, which can not only increase the number of interactions between students and teachers, but also improve the functions and roles of students in the learning process, and then establish a "student-centered, teacher assisted" teaching system to realize the organic combination of online and offline, in class and extracurricular between students and teachers, and promote discovery Discussion and case teaching can further play the main role of students. The teaching of Cross School courses is not only free of learning time and place, but also has playback function in its online teaching video. When students encounter obscure knowledge points, in addition to communicating with teachers and classmates, they can also look back at the teaching video to solve the problem, so as to achieve a thorough grasp of the knowledge points.

## 3. Analysis of teaching problems of Cross School study

Different from the traditional teaching mode, cross school course teaching not only provides students with a good learning environment and learning resources, but also enhances students' awareness of active learning and makes them enjoy the interest and significance of the learning process. However, referring to the actual effect of the teaching of Cross School courses and the feedback of teachers and students, it is found that the following main problems still exist in the teaching of Cross School courses.

### 3.1. Too many teaching contents and too long teaching time

During the teaching and implementation of data structure and algorithm, because the teaching content is complex and trivial, and the classroom teaching lasts 45 minutes, there is no spare time for students to digest and understand the knowledge points, and the precise and detailed presentation of the knowledge points cannot be achieved, resulting in a great discount in Teaching results and learning effects.

### 3.2. Some students lack interaction and their learning enthusiasm is not high

For online teaching, the time and place of class are often random. During the learning process, some students lack self-control, and their learning efficiency is low when playing the teaching video, which can not keep up with the rhythm of the teacher's class, and even the phenomenon of "only opening the Internet, and people are not there" appears.

### 3.3. The assessment and evaluation system is single, and the learning process is not sustainable

If students' grades are evaluated only based on the final exam or online recording times, the examination results are often not comprehensive and can not truly reflect students' actual ability and professional quality. Moreover, the final examination results account for a high

proportion in the assessment, students are easy to slack off in the early learning process, there is a "cramming before the exam" mentality, and the learning process is also lack of continuity.

### **3.4. Insufficient combination of theory and Practice**

Because 《Data Structure and Algorithms》 is a course with the background of program design and has strong practical characteristics, how to increase the practical teaching content and realize the combination of theoretical knowledge and practical cases is also an urgent problem to be solved.

## **4. Summary Teaching strategies for Cross School study**

In view of a series of problems existing in the teaching of Cross School courses, the project team adopted the following teaching strategies after extensive research and full discussion.

### **4.1. Realize "refined" teaching and improve learning efficiency**

The teaching of Cross School courses takes important knowledge points as the core, combs and optimizes the knowledge involved, refines and thickens the knowledge points through the integration and combing of teachers, and focuses the explanation time of thick knowledge points on, so as to realize the fine and detailed explanation of knowledge points, so that students can concentrate on learning and understanding. Cross School study teaching builds a new "teaching and learning" mode, strives to ensure the refinement of the course and teaching content, and maximizes the use of Internet resources to avoid students feeling boring in later learning, so as to lose interest in the course.

### **4.2. Increase learning interaction links to stimulate learning enthusiasm**

By enhancing the interaction and communication between students, students' enthusiasm for learning and the interaction of courses can be improved. During the teaching process, students in the class are divided into groups and assigned homework and tasks according to groups. Instead of evaluating students individually, the overall performance assessment is carried out in groups according to the completion of tasks. This can increase the communication between students, guide students to cooperate with each other in the learning process, and enhance students' collective cooperation awareness.

### **4.3. Continuously pay attention to the learning process and enrich the evaluation system**

According to students' learning conditions, establish a multi-faceted assessment system, mainly including online, offline assessment and final examination. Online assessment can be based on students' learning time, class discussion, online homework accuracy and other items; Offline assessment focuses on testing students' comprehensive quality, which is mainly based on students' classroom performance, usual testing and class attendance times; Check students' mastery of the course through the final examination. Establish an assessment system combining online, offline assessment and final examination to comprehensively measure students' learning of the course.

### **4.4. Realize the combination of theory and Practice**

It can simulate actual cases, assign exploratory tasks to students before class, let students learn the teaching content with problems, organize students to discuss in groups during class, and then feed back the completion of the problems to teachers, who will then score and evaluate according to the completion of students. The topics discussed can include "traffic light setting" or "decimal conversion", so that students can apply their knowledge to solve practical problems, realize the effective combination of theoretical teaching and practical application, and cultivate students' ability to solve practical problems.

## 5. Summary

The course 《Data Structure and Algorithms》 based on the cross school learning platform adopts the online and offline hybrid teaching mode, which can better focus on students in learning, and effectively exercise and improve students' autonomous learning ability. With the help of online resources, students preview and review by themselves according to their abilities, habits and mastery, and adjust the learning progress, time, speed, etc., truly realizing the master status of students.

This course implements online and offline hybrid teaching, which enables teachers to make a qualitative leap in the understanding of information-based teaching concepts and methods, as well as the use of various tools and other related technologies, so that students participate more in the classroom, are more interested in learning, master knowledge more firmly, improve students' ability to solve practical problems, and meet the requirements of the training of Applied Talents in schools.

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