

# Exploration of Data Structure Teaching at The Guidance of Ideological and Political Education

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## Abstract

**In view of the difficulties existing in the teaching of data structure course (such as students' incomplete understanding of concepts, insufficient visualization, insufficient programming training, and difficulties in applying), the paper analyzes the characteristics and ideological and political connotation of data structure course, and explores the implementation path of ideological and political teaching of data structure course. This paper uses diversified teaching methods and multi-dimensional evaluation system to enrich classroom teaching and strengthen the organic combination of ideological and political education and curriculum content. The offline and online hybrid teaching mode based on the ideological and political perspective of the curriculum was proposed, which provides a valuable reference for the ideological and political teaching of the professional curriculum.**

## Keywords

**Data structure, Ideological and political education, Offline and online hybrid teaching mode.**

## 1. INTRODUCTION

In June 2020, the Ministry of Education issued the Guiding Outline for Ideological and Political Construction of Courses in Colleges and Universities proposed that ideological and political education should be comprehensively promoted and implemented [1]. Ideological and political education is an obligation of each course and a teaching concept [2]. Through mining and refining ideological and political education resources such as family and country feelings, social responsibility, ethical norms, scientific and humanistic spirit contained in the course, we can achieve the organic unity of knowledge teaching and value guidance, and build a pattern of all staff, whole process, and all-round education that all kinds of courses and ideological and political courses are in the same direction and in multi cooperation [3]. At the background of new engineering education, the deep integration of ideological and political education with relevant engineering professional courses is a problem that every engineering teacher must seriously face and think about in the new era. The rapid development of new technologies, such as big data, cloud computing, Internet plus, has increased the demand for computer professionals in all walks of life. It is a new mission and challenge for engineering education to increase the role of computer professional knowledge and skills in engineering talent education, and pay attention to the ability cultivation of talents and the improvement of comprehensive practical quality. Data structure is an important professional course in computer science, and a core course among mathematics, computer hardware, and computer software, which is highly theoretical and practical. The data structure course is complex and abstract. The teaching mode is lack of rationality, which is easy to make students unable to fully grasp and be familiar with

the knowledge content. And it is difficult to effectively improve the teaching efficiency. Therefore, in the process of actually carrying out the data structure classroom, teachers should adopt the online and offline mixed teaching mode to improve the students' learning initiative and strengthen the teaching effect. This paper will deeply analyze the nature and characteristics of the data structure course, the current teaching situation of the data structure course, and the specific practical strategies of the data structure teaching reform based on the online and offline hybrid teaching mode.

## **2. CHARACTERISTICS OF DATA STRUCTURE COURSE AND IDEOLOGICAL AND POLITICAL CONNOTATION**

### **2.1. Characteristics of Data Structure Course**

In the course system of computer science, the data structure course plays a connecting role. It is a backbone course of network engineering, computer science and technology, and an important technical and theoretical basis for computer programming. In addition, the data structure course is also a key subject of the national key examination of computer technology and software technology.

The data structure course mainly includes the storage and implementation of basic data structures such as linear tables, stacks, queues, strings, arrays and generalized tables, trees, graphs, and the application of classical algorithms for searching and sorting. The key content of the data structure course involves a variety of contents, including sorting algorithms, various retrieval algorithms, and some basic data structures. For each data structure, C/C++ language can be provided, and quantitative algorithm and qualitative algorithm analysis can also be performed. This can improve students' efficiency in using computers, strengthen the effectiveness of information transmission, organization and storage, enable students to fully master and be familiar with various data structure representations, functions and basic operation interfaces, improve the flexibility of data structures and various algorithms, and effectively solve practical problems involved in life. Therefore, learning data structure is particularly critical for students, which is conducive to improving their practical ability and theoretical cognitive ability [4].

### **2.2. Ideological and Political Connotation of Data Structure Course**

The content of ideological and political elements in the curriculum should be related to the content of professional courses. Ideological and political elements can slowly penetrate into the teaching of professional courses in classroom teaching. If the added ideological and political elements and professional knowledge cannot be effectively integrated, and the internal relationship between the professional courses and ideological and political content is separated, the teaching effect will be greatly reduced. Therefore, in the process of integration of ideological and political elements, we must deeply explore and integrate the contents of professional courses and ideological and political content. Data structure is an important foundation of professional courses such as operating system and compiler principle, and it is a course that pays equal attention to theory and practice [5]. From the deep connotation requirements of the curriculum, teachers should actively explore the ideological and political elements related to the curriculum according to the characteristics of the curriculum at the practical level [6]. The relationship between curriculum teaching and ideological and political education is explored from the knowledge content, teaching methods and curriculum evaluation, as well as the curriculum content. Table 1 is the specific corresponding relationship between curriculum teaching and ideological and political education.

**Table 1.** Correspondence between data structure course content and ideological and political elements

Chapter	Theoretical theme	Ideological and political themes
Chapter 1. Introduction	Software Technology (China Core and China Dream)	Work and study hard to realize the Chinese Dream
Chapter 2. Linear Table	Single linked list traversal	Study hard and think deeply, be realistic and pragmatic
Chapter 3. Stack and Queue	Aerospace craftsman	Establish a rigorous and meticulous work style and refined work attitude
Chapter 4. String	Delete operation	Protect the environment and make human and nature coexist harmoniously
Chapter 5. Arrays and Generalized Tables	Two-dimensional array	National confidence, national pride, feeling the power of China's great rejuvenation
Chapter 6. Trees	Binary tree height algorithm	Establish a sense of responsibility and mission of not being willing to lag behind, striving bravely to be the first and pursuing progress
Chapter 7. Graph	Ergodic graph	Brainstorm, brainstorm, cooperate and do our best
Chapter 8. Search	Search application	China's strength, speed, wisdom and confidence
	Chunked index	Inherit and carry forward Chinese characters, highlight national confidence and cultural confidence
	Hashtable	Scientific thinking, seeking change and innovation
Chapter 9. Sequencing	Merge sort	Team awareness and overall view

### 3. IMPLEMENTATION OF IDEOLOGICAL AND POLITICAL EDUCATION IN DATA STRUCTURE COURSE

The implementation path of ideological and political education of data structure experiment course is shown in Figure 1. In order to effectively carry out ideological and political education of the course, reverse design is adopted, starting from internal and external needs, according to the corresponding relationship between data structure experiment course objectives and professional graduation requirements, and starting from supporting graduation requirements indicators, the experimental syllabus, experimental instructions, and experimental assessment indicators are revised.

(1) Determine teaching objectives. The teacher needs to add the task of ideological and political education to the teaching task of data structure, and increase the requirements of ideological and political education. It is important that the goal of ideological and political education to be achieved by this course is to cultivate students' computational thinking and engineering literacy.

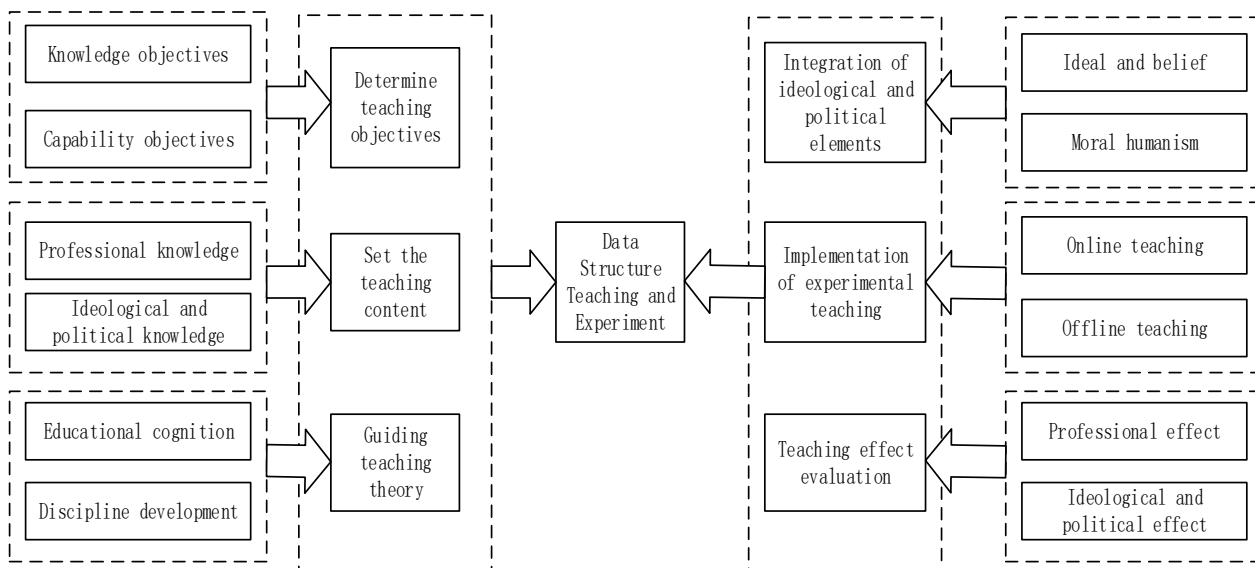
(2) Teaching content setting. To carry out ideological and political education in professional classes, we should consider how to integrate the content of ideological and political education into the knowledge points of professional courses. The integration between knowledge points and ideological and political education should be natural and not abrupt. Teachers need to sort out the content of the data structure course, deeply interpret the knowledge points, explore the elements of ideological and political education contained in it, and add specific content and cases of ideological education that can be organically integrated with professional knowledge in the experimental guide.

(3) Teaching theory guidance. The revision of the teaching content of the experimental guidance book should be carried out under the guidance of the teaching theory, following the

law of the development of computer science, and following the characteristics of the law of educational cognition and ideological and political work. The experimental teaching of data structure is a very important part of this course. Each chapter needs corresponding experimental courses to deepen the understanding of the content, comprehensively consolidate the foundation, and then integrate knowledge points to achieve flexible learning and application. Therefore, carrying out relevant "ideological and political" education in the experimental link is also crucial to cultivate students' personal spirit, character and ability, and is an important way to strengthen the construction of "curriculum ideological and political".

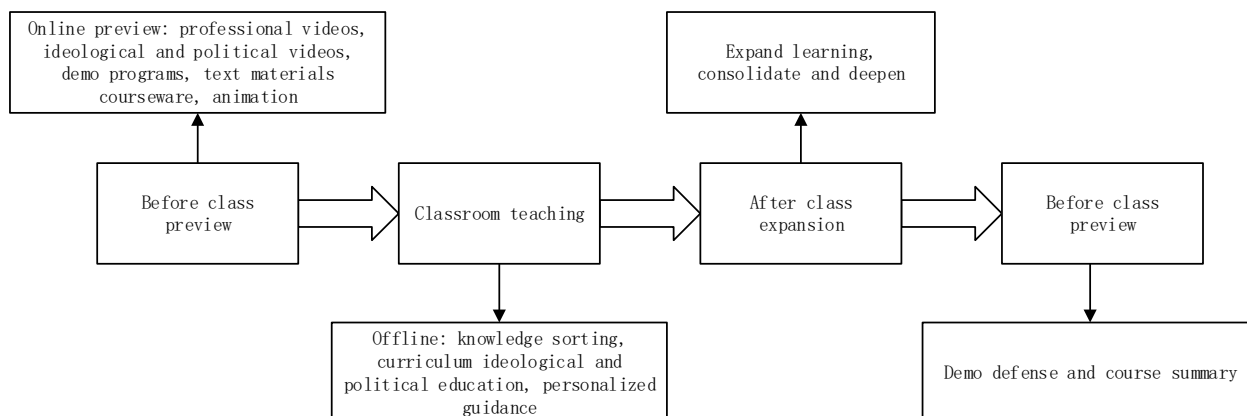
(4) The ideological and political elements are integrated. Classroom teaching is the main form of teaching implementation. To integrate ideological and political education into classroom teaching, we need to make full use of diversified teaching methods. Reform traditional classroom, integrate online teaching platform and learning resources, display ideological and political elements in multimedia form, reform classroom teaching methods, adopt heuristic teaching, case teaching, analogy and association and other teaching methods

(5) Implementation of experimental teaching. The ideological and political elements related to the data structure experiment course are mainly reflected in two aspects. First, in terms of personal spiritual quality, because the data structure experiment is to implement the algorithm idea with code, it requires not only that the code can be correctly executed, but also that the code has good time complexity and space complexity. During this period, students are required to overcome one problem after another and correct one mistake after another, which can fully cultivate the students' spirit of being meticulous, brave to overcome difficulties and brave to climb the peak of life. Second, in terms of the cultivation of team cooperation spirit, students' team cooperation awareness and spirit are cultivated and their team cooperation quality is cultivated through the arrangement of comprehensive large homework and the requirement of students to complete it in groups



**Figure 1.** Ideological and Political Implementation Path of Data Structure Experiment Course

The online and offline hybrid teaching process is shown in Figure 2. The hybrid teaching implements the teaching mode of combining online teaching and offline teaching and making overall plans.



**Figure 2.** Online and offline hybrid teaching

According to the characteristics of the data structure experiment course, the project driven teaching method can be used for the difficult points in the teaching content. Outside the classroom, students make full use of online knowledge point videos, algorithm demonstration programs and other resources for independent learning, and provide ideological and political videos closely related to professional knowledge points. Before class preview, students can watch ideological and political videos to learn about ideological and political elements related to the course content and arouse interest in learning. In the classroom, the teacher explains the difficult points. In the process of students' experiment, the teacher provides personalized guidance. The students can also complete the experimental tasks in groups, which will imperceptibly cultivate the students' team spirit.

#### 4. CONCLUSION

This paper integrates ideological and political education into data structure course teaching, adopts online and offline mixed teaching mode, uses diversified teaching methods and multi-dimensional evaluation system, strengthens the organic combination of ideological and political education and course content. The offline and online hybrid teaching mode is proposed based on curriculum ideological and political perspective, which can be used for computer and information courses to learn from and share experience.

#### 5. ETHICAL APPROVAL

This article does not contain any studies with animals performed by any of the authors.

#### 6. ETHICAL APPROVAL

This article does not contain any studies with human participants or animals performed by any of the authors.

#### 7. FUNDING

This study is funded by the Huaiyin Normal University curriculum reform project (Grant No. SZJG062).

#### 8. CONFLICT OF INTEREST

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## 9. DATA AVAILABILITY STATEMENT

No data were used to support this study.

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