

Exploration of a Blended Teaching Mode for Data Structures Based on Curriculum Ideology and Politics

Zhenhuan Kang, Liang Fang, Manli Zhang

School of Mathematics and Statistics, Taishan University, Tai 'an, Shandong, China,271000

Email address: 114136957@qq.com

Abstract—Based on the teaching practices of the Data Structures course, the traditional single-mode teaching approach can no longer meet current educational demands. Therefore, this paper integrates ideological and political elements into the curriculum and combines it with blended teaching methods. This integrated approach is incorporated into Data Structures instruction to stimulate students' independent learning and enhance communication and interaction between teachers and students, as well as among students themselves.

Keywords— Data Structures, Blended Teaching, Curriculum Ideology and Politics.

I. INTRODUCTION

Engels once said that the theoretical thinking of every era is a historical product, which has very different forms in different times and therefore has very different contents. President Xi emphasized, it is essential to leverage classroom teaching as the primary channel for education. Ideological and political theory courses must be continuously refined and strengthened to enhance their relevance and appeal, ensuring they meet students' developmental needs and expectations. At the same time, all other academic disciplines should uphold their specific roles and responsibilities, working in concert with ideological and political theory courses to align in purpose and direction. Such collaboration fosters a cohesive and synergistic educational framework, ultimately contributing to the holistic development of students. In February 2020, as the COVID-19 pandemic prevented students from returning to campus, the General Office of the Ministry of Education (MOE) and the General Office of the Ministry of Industry and Information Technology (MIIT) jointly issued the "Notice on the Arrangements for 'Suspended Classes But Continuous Learning' During the Postponement of the Spring Semester for Primary and Secondary Schools."

Online teaching and offline teaching have their own advantages and disadvantages [1]. We can complement the advantages and disadvantages of both, and integrate ideological and political elements to achieve the optimal educational effect.

II. THE BACKGROUND OF EXPLORING THE BLENDED LEARNING MODEL FOR IDEOLOGICAL AND POLITICAL EDUCATION IN THE CURRICULUM

Newton once remarked, "if I have seen further than others, it is by standing on the shoulders of giants." Over the years, this field has witnessed numerous scholars proposing innovative ideas and conducting extensive research, each building upon the foundations laid by their predecessors. In

2020, Cheng Hongfang et al. implemented online instruction for data structures courses by integrating the Yangtze River Cloud Classroom platform with QQ Group during the COVID-19 pandemic, adapting to the urgent need for remote learning solutions [2]. The following year, Zhang Chunling tackled pedagogical challenges in data structure education by designing an online-offline blended teaching model based on the BOPPPS framework and leveraging the Learning Hub platform [3]. By 2025, Chen Chunyan et al. further refined this approach by incorporating smart teaching tools such as Learning Hub and Cloud Classroom into the BOPPPS model [4]. Their work introduced online learning elements and established the OBOPPPS intelligent teaching paradigm, demonstrating a continuous evolution toward more integrated and technology-enhanced educational practices. This progression illustrates how each contribution has expanded upon earlier work, driving innovation and effectiveness in the teaching of data structures.

This paper explores the integration of online and offline teaching approaches in data structures education, reconstructing a pedagogical process that combines "online knowledge delivery with foundational guidance + offline deepening of understanding and value enhancement". The exploration of integrating ideological-political education into blended teaching models represents an inevitable choice to address national strategic needs, resolve current educational challenges, and align with the development of educational technology.

III. IMPLEMENTATION OF TEACHING MODE

Modern education requires a comprehensive approach that fully utilizes digital teaching tools, expanding from traditional classroom-focused instruction to holistic pedagogical practices. Teachers should monitor students' self-directed learning using online resources both before and after class. The instructional process is structured through the following key components.

A. Pre-class

This course utilizes the "Learning Tong" platform as its core carrier, housing a variety of structured teaching resources such as clear learning objectives, presentation slides (PPT), and instructional videos delivered by renowned educators. These materials enable students to independently review learning goals and preview class content before each session, fostering a self-directed and proactive learning experience.

This approach not only enhances students' autonomy and sense of responsibility in learning but also helps instructors identify knowledge gaps early on and adjust teaching strategies in a timely manner. It embodies a blended learning paradigm that seamlessly integrates online self-study and offline interactive instruction, ultimately creating a more dynamic, efficient, and student-centered educational environment.

B. During the Class Session

Teachers use the knowledge that students have mastered before class to design high-order thinking activities, guide students from "know" to "understand" and then to "use", realize value shaping, guide students from simply knowing to deeply understand and effectively apply knowledge, and promote the internalization of values.

1) Reviewing the knowledge points of the last lesson, students can sort out the knowledge they have learned and quickly enter the learning state.

2) Explain the homework reserved in the last class (students are selected before class to write the answers on the blackboard and comment on them in class), as shown in Figure 1.

Assignment

1. Draw the following for this directed graph:

(1) Adjacency list;
 (2) Inverse adjacency list;
 (3) Cross linked list;

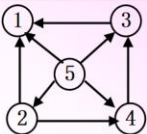


Fig. 1. Student assignment status

3) Teachers can utilize platforms like Learning Tong's voting and quiz features to create quick pre-class quizzes or questions, allowing real-time assessment of preparation effectiveness and identification of common learning challenges. This approach helps both teachers and students clearly understand the core issues to focus on during the lesson. Teachers should then reiterate the lesson's learning objectives and educational goals with clarity.

4) Instructors should carefully select case studies aligned with core concepts to introduce lesson content. For example, many course topics correspond to real-world social norms and principles—such as illustrating queueing theory through everyday waiting line phenomena [5]. Course content and pace should be dynamically adjusted based on learning objectives and online student performance metrics, with intentional pauses during instruction to encourage independent thinking and reflection. Integrating ideological education into subject-specific teaching not only increases student engagement but also enhances learning efficiency. When introducing key algorithms, instructors may share stories of pioneering computer scientists such as Alan Turing and John von Neumann, highlighting their innovative vision, scientific rigor, and sense of social responsibility. Each class should conclude with approximately five minutes of in-class exercises

to consolidate understanding and allow instructors to assess whether learning objectives have been met.

5) Assigning homework and getting students to turn it in on time is a good way to assess how well the learning goals are being met.

C. After Class

The chapter exercises were systematically organized, and students completed them through the online platform. This digital approach enhanced the clarity and accessibility of learning data, allowing instructors to monitor student progress and evaluate learning outcomes effectively based on exercise performance.

D. Ideological and Political Thought Runs Through the Whole Process

Develop a comprehensive ideological and political education curriculum framework aligned with disciplinary characteristics, integrating these elements into lesson plans. Enhance the effectiveness of ideological integration through teaching case studies. Collect up-to-date instructional materials and case studies relevant to the course, supplementing and adapting them by organizing book resources and online materials into chapter-based examples. Transform these resources into classroom-ready case studies, then progressively implement them in teaching practices.

In teaching, ideological and political elements are integrated into the classroom like salt into water, and the "educational function" and "moral education elements" are integrated into the classroom in a "silent way", which naturally follows the professional context of the course and organically integrates these elements.

Ideological and political elements are seamlessly integrated throughout the entire teaching and learning process, serving as a foundational thread that connects each stage of instruction. This continuous incorporation ensures that value guidance becomes a natural and reinforcing part of students' educational experience.

IV. TEACHING REFLECTIONS

The seamless and organic integration of online and offline teaching methodologies significantly facilitates the efficient sharing and robust consolidation of educational resources across various platforms. This harmonious blend is particularly instrumental in fostering a more equitable educational landscape, thereby elevating the overall level of educational fairness and accessibility. Additionally, this integrated approach serves as a catalyst for the rapid advancement and widespread adoption of the "Internet Plus Education" paradigm, which is pivotal in driving the comprehensive digital transformation within the educational sector. By enhancing its attraction and relevance, it ensures that the curriculum resonates more deeply with students, effectively engaging their thoughts and emotions in a more meaningful and impactful manner.

A. The online check-in rate of "Data Structures" is 100%, which is a means to supervise students' learning. As shown in Figure 2.

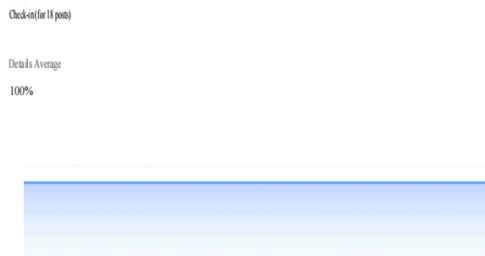


Fig. 2. Student sign-in status

Instruction," China Information Technology Education, no. 14, pp. 109-112, 2025.
 [5] Q. Sun, "Teaching Reflection and Reform of the 'Data Structure' Course," Computer Education, no. 22, pp. 66-67, 35, 2009.

- B. Online learning improves the intuitiveness of data. By using the random order of questions and options in multiple-choice questions on online platforms, students can be assessed in real time and the results can be counted in real time.
- C. In online teaching, teachers cannot quickly capture students' micro-expressions, and students' learning effectiveness varies. Therefore, it is necessary to provide offline teaching and answering questions to students in a timely manner. However, online teaching also improves students' ability of active learning. Figure 3 shows the post-class guidance for students.

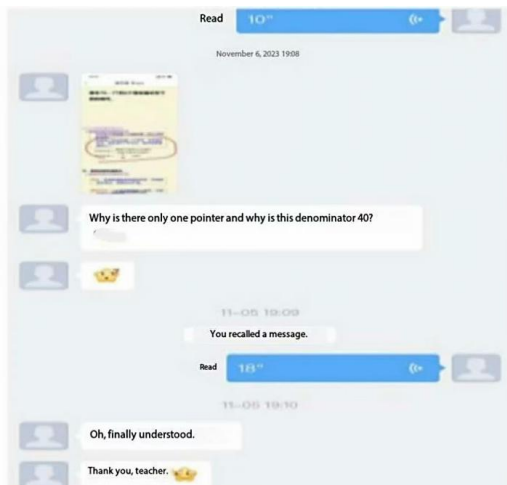


Fig. 3. Student problem explanation

In short, there are both advantages and disadvantages in the teaching implementation of data structure. It can improve students' self-learning ability and cultivate their comprehensive ability, but it needs to be further improved in terms of students' learning monitoring and better improvement of this course.

REFERENCES

- [1] D. Pu, Y. Sun, Y. Chen, et al., "Exploring and Practicing SPOC-Based Blended Online-Offline Teaching Models," Journal of Changchun Normal University, pp. 149-154, 2019, no. 10.
- [2] C. Hongfang and X. Wang, "Online Teaching Practice and Research of 'Data Structures' during the Pandemic," Computer Knowledge and Technology, vol. 16, no. 33, pp. 26-27, 2020.
- [3] C. Zhang, "Application Research of Online and Offline Teaching Model in Data Structure Course Based on BOPPPS Model," Modern Vocational Education, no. 28, pp. 36-38, 2021.
- [4] C. Chen, S. Yang, and Y. Liu, "Exploration and Practice of an Improved BOPPPS-Based Smart Teaching Model in Data Structure Course