Based on Student Learning Data Management Platform a Framework and Strategies of Ideological and Political Elements Discovering in Computer Algorithm Course

Yanhong Yang[1], Bingjie Zhang[2], and Zhihong Dong[3(✉)]

[1] Department of Computer Science and Technology, Beijing Institute of Graphic Communication, Beijing, China
yangyanhong@bigc.edu.cn

[2] School of Information Engineering, Beijing Institute of Graphic Communication, Beijing, China

[3] Department of Intelligence Science and Technology, Beijing Institute of Graphic Communication, Beijing, China
dongzhihong@bigc.edu.cn

Abstract. In China's teaching reform, the ministry of education requires strengthening ideological and political education and puts forward the integration of Ideological and Political Elements (IPE) education into all courses. With the help of the student learning data management platform, we can accurately obtain students' learning feedback information, analyze it, and explore the content of students' ideological and political content. In this paper, we first propose a framework for mining ideological and political elements and discuss some strategies. Secondly, based on our three-year curriculum reform and construction, taking the computer algorithm course as an example, this paper introduces a case study in detail with the whole statement of the teaching process. Through our questionnaire survey, most students are highly satisfied with the meticulously designed integration of Ideological and political elements which can promote their interests in learning professional courses.

Keywords: Learning Data management platform · Ideological and Political Education · Elements Discovering · Case Study

1 Introduction

General Secretary Jinping Xi stressed all courses bring ideological and political education to form a synergistic effect at the National Conference on Ideological and Political Work in Colleges and Universities [1]. In recent years, most universities have promoted the classroom teaching reform of "curriculum ideological and political", and integrated ideological and political education elements into curriculum teaching [2].

However, these teaching reforms are not simply giving ideological and political activities or content to the classroom teaching, they need seamless integration with the

curriculum's objectives and content. Many Chinese scholars have done some research in this field. A computer simulation system for ideological and political teaching is designed based on the algorithm and other theoretical foundations by Zhu [3]. Tan focused on the IPE construction of the curriculum with innovative teaching models from top-level design [5]. Tang proposed a knowledge map and constructed a course IPE for the university computer foundation course [6]. Based on the online and offline teaching mode of the smart classroom, Du integrated the concept of educating people into the digital electronic technology teaching of electronic courses, starting from the point of convergence between electronic technology and ideological education, infiltrated and integrated thinking in the teaching process of online and offline courses [7]. Focusing on the new trend of integrating the 'Four Self-confidence' into the ideological and political construction of the curriculum, Chen proposed specific implementation standards in the process of integrating the 'Four Self-confidence' into the ideological and political construction of the curriculum [8].

With the help of the student learning data management platform, we can accurately obtain students' learning feedback information, analyze it, and explore the content of students' ideological and political. The research contributions of this article include the following:

A framework is proposed from three aspects for PLE discovery.

Based on the framework, strategies are discussed for the successful discovery of PLE elements. Five strategies are significant and easy to operate in teaching.

A real case of PLE teaching is presented to validate that the result is satisfied and accepted by students with dedicated design.

2 Framework of PLE Discovery

In this section, an applied universal framework is proposed for discovering PLE. The framework is divided into three aspects. The three aspects of the framework basically cover the types of ideological and political elements.

The first aspect is the national consciousness including political identity, cultural literacy, and global vision. The element content corresponding to the first aspect is given in Fig. 1. The definition of Political identity is that people have a sense of emotional and conscious belonging in social and political life. It is closely related to people's psychological activities. When people live in a certain society, they always have to determine their identity in a certain social connection. Cultural literacy is mainly based on the history of the Communist Party of China and Chinese traditional culture. Global vision pays more attention to the community with a shared future for mankind, learns and accepts excellent international culture and experience, and enhances the awareness of environmental protection.

The second aspect is values cultivation which contains moral cultivation and legal consciousness. Chinese core values have been put forward since 2006, including three aspects of the country, society and individuals that have influenced the values of Chinese society in the past ten years.

The second part, legal consciousness, is where the engineering discipline needs to be strengthened. First, understand the legal rules, and you need to comply with local

national consciousness

political identity	cultural literacy	global vision
• theoretical confidence • institutional confidence • cultural confidence.	• the excellent traditional culture of the Chinese nation, • the revolutionary culture of the Communist Party of China • the socialist culture with Chinese characteristics in the new era	• community with a shared future for mankind • world culture • global issues • environmental protection

Fig. 1. National consciousness [Owner-draw]

values cultivation

moral cultivation	legal consciousness
• The core values of Chinese socialism	• rule of law • awareness of rights • responsibility and discipline

Fig. 2. Values cultivation [Owner-draw]

professional spirit cultivation

scientific spirit	professional awareness
• scientific thinking method • positive attitude • cooperative awareness • inclusive • democratic • skepticism	• pursuit of perfection • risk awareness • innovative spirit • professional ethics

Fig. 3. Professional spirit cultivation [Owner-draw]

laws and regulations for design product development. The awareness of rights and the awareness of safeguarding their legitimate rights and interests. Finally, have a strong sense of responsibility and discipline (Fig. 2).

The third aspect is professional spirit cultivation including scientific spirit and professional awareness.

The scientific spirit includes, but is not limited to, the following attributes: scientific thinking, positive attitude, cooperative consciousness, tolerance, democracy and skepticism. Professional awareness, pursuit of perfection, crisis awareness, pioneering and innovative spirit, professional ethics (Fig. 3).

3 Strategies of PLE Discovering

In this section, five strategies will be mentioned as shown in the Fig. 4. Teaching assistants and feedback directly affect the core part, then the core part and other courses need to coordinate and promote each other.

3.1 Rethink the Teaching Content

After teaching the course for 3 to 5 years, teachers know their teaching content very well and will form a fixed method and style. Although some new content or minor changes will be added, this is not enough in PLE reform. Therefore, we would return to the initial stage of teaching preparation and rethink our teaching content.

3.2 Fully Understand Your Students

Every new semester, we would better invest in the academic background of students, living conditions and cultural background. Fully understanding the situation of students will help to successfully achieve goals in teaching.

There is some importance in the excavation of ideological and political elements. In the classroom, more interesting and more relevant contents can be arranged that students would understand easily. When we choose the material stories of PLE, we hope to give students refreshed feelings, rather than repeated platitudes.

3.3 Use the Experience of Student Teaching Assistants

It is a pity that in some schools, not all courses have teaching assistants. We found that student teaching assistants play a great role. For the following reasons:
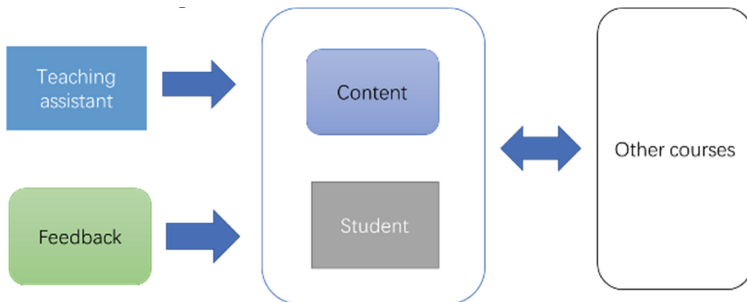

Fig. 4. Relationship diagram of five strategies [Owner-draw]

(1) Student teaching assistants are usually students who have only been studying this course for a few years, so they are very aware of the difficulties and problems they encounter during the learning process. On the contrary, during the process of teaching, teachers are more and more familiar with the teaching contents, and may not feel the difficulties of students' learning. Therefore, student teaching assistants can effectively help teachers to strengthen some knowledge difficulties.

(2) Student teaching assistants are more affinity than teachers. Student teaching assistants are 1–2 grades older than the students they teach and are more accessible to students in class. Students will be more open to communicating their problems in the learning process. In the excavation of ideological elements, they have similar ages and exposure to similar environments, which will help the team to get key suggestions.

(3) The choice of our student teaching assistants is to choose students with good learning ability and a strong sense of responsibility. The student teaching assistants are very serious and can complete the task well.

3.4 Get Feedback in Time

Leveraging student feedback is a key factor in our continuous improvement throughout the teaching process.

Getting timely feedback from students can help us make adjustments in future courses. It is necessary to adhere to the teaching plan and complete the course content, but it is also necessary to adjust according to the dynamics of student feedback, which will encourage students to actively participate in the course and continuously optimize the course.

3.5 Collaborate with Other Specialized Courses

The purpose of teaching is to achieve the goal of cultivating students who meet the requirements for graduation, and there will be a mutual supportive relationship between the curriculum and the curriculum. For example, in the study of computer science, data structures are the basis for algorithm courses, database courses, discrete mathematics and other courses. There is also a case where there are different courses, but there is a duplication of knowledge points in the teaching. For example, graph theory appears in both algorithm courses and discrete mathematics courses.

Therefore, the selection of PLE requires multiple courses to be designed at the same time. Use different cases whenever possible, otherwise students will feel like repeating old stories all the time. In this way, at the end of each semester, the course teachers can present their curriculum design and use of ideological elements, and coordinate with each other.

4 Case Study

In this section, we will explain how to excavate PLE through a specific real lesson problem, and analyze the value and significance of PLE for the teaching of the subject.

4.1 Basic Information About the Computer Algorithm Course

This course aims to help students master the basic theories and methods of algorithm design and analysis. The main contents of the course include the introduction to algorithms and asymptotic analysis, divide and rule, dynamic programming, greedy algorithms, graph algorithms, and difficult problems. Based on mastering the principles of algorithms, students are required to have the ability to model problems, design and program implementation algorithms, and theoretically analyze the performance of algorithms in combination with typical application scenarios.

4.2 PLE Discovery Taking the Stable Matching Problem as an Example

The first problem introduced in my algorithm class is the Stable Matching Problem, given a set of preferences among hospitals and medical school students design a self-reinforcing admissions process. In 1962, economists David Gale and Lloyd Shapley proposed an algorithm that can self-enforce to obtain the best match for some common matching problems in life [4]. With this question as background, the process of PLE discovery will be demonstrated.

The first aspect in framework can cultivate an international vision and allocate talent resources reasonably. The two people who proposed the algorithm won the Nobel Prize.

The second module refers to fairness and justice in the socialist core values, and we also need to reflect fairness in our algorithm, because we conduct stable matching to make everyone reach a satisfactory state.

Subsequently, we discuss the excavated elements with the teaching assistants and integrate the above elements in a very natural state, because the students are particularly disgusted with deliberate preaching.

4.3 Result Analysis

4.3.1 Student's Grades

The overall grade for this course is made up of 40% of the lab report grades and the project grades. The experimental part will give a more detailed solution to help students set up scaffolding. Students need to complete the corresponding content by themselves. We will not explain the project in detail, requiring students to complete it independently, which has a relatively high degree of difficulty.

We compare the proportions of the three-year student experimental report distributions. As shown in Fig. 5, the distribution of the scores obtained by students each year. The first year is designed without introducing IPEs, the second year is to try to introduce IPE, and the third year is complete education on IPE. The grades show an increasing proportion of students getting A grades in three years.

The reasons for this achievement may be as follows: We deliberately introduced well-designed ideological and political elements to make students have a more correct learning attitude and complete the report more seriously.

The professional quality of the students has been improved, and they are more exploratory and have carried out independent exploration and innovation in major assignments.
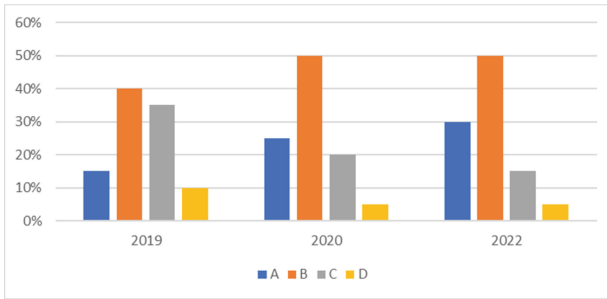
Fig. 5. Score proportion distribution in three years [Owner-draw]

Table 1. Survey of the course in 2022 [Owner-draw]

How difficult is this course?	Difficult 40%	Normal 30%	Easy 10%	Not sure 20%
How much do you like the course?	Like 60%	Normal 20%	Dislike 20%	
Does this course has improved the educational significance of life?	Yes 70%	Not obvious 30%	No 0%	
Does this course help you understand other professional courses?	Yes 90%	Not obvious 5%	No 5%	
Would you recommend this course to others?	Yes 70%	No 5%	Not sure 25%	
Did your confidence change after completing the course?	Improved 60%	Not change 10%	Decrease 30%	

Another possible reason is that students learn from each other and refer to each other. Although we use information technology to compare and check texts, we cannot eliminate the phenomenon of plagiarism.

4.3.2 Student Feedback

We surveyed anonymous feedback from 20 students in 2021. The questions and results of the survey in the last year are shown in the Table 1.

Some challenges also require constant learning and understanding from students. It is clear to see that students are glad to share their experience and encourage others to sign up for this course. The individual situation of students is different, and we will try our best to help the difficulties encountered by individual students in the learning process.

5   Conclusions

The construction of ideological and political courses is significant based on Student Learning Data Management Platform. In the current Chinese educational environment, ideological and political education is a necessary element for each course. In this paper, the framework and methods of mining ideological and political elements is proposed, and the process of integrating ideological and political elements is introduced through a real case, which provides an effective reference for the ideological and political construction for other courses. Through the integration of information technology and ideological and political elements, the quality of teaching can be effectively improved, but it also requires teachers' effort.

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