

# Research and Practice of Ideological and Political Education in the Course of Data Mining and Analysis

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**Abstract:** The cultivation of moral character and the education of students are the fundamental tasks of higher education. In order to implement this fundamental task, this paper focuses on the course objective of "combining knowledge imparting with value guidance", and based on the characteristics of the course, explores and investigates the ways and methods of integrating ideological and political education into the teaching of professional courses in the construction and implementation of the "Data Mining and Analysis" course. This paper mainly explores the integration of ideological and political elements into the teaching of the course from four aspects: course objectives, teaching design, teaching process, and teaching evaluation. By integrating ideological and political elements into various aspects of teaching in a planned manner, moral education can penetrate and achieve the goal of "ideological and political education entering the hearts of students and influencing them silently". This research has a certain universality and can provide useful reference for the practical teaching of ideological and political education in relevant colleges and universities.

## 1. Introduction

As a new educational concept, "course-based ideological and political education" is a new requirement, measure, and direction to strengthen talent cultivation and ideological and political education in universities in the new era, fundamentally responding to major theoretical and practical issues such as "for whom to cultivate people, what kind of people to cultivate, and how to cultivate people" [1]. The construction of "course-based ideological and political education" is also a pursuit of the origin of "teaching, educating, and guiding" by university teachers. It is the responsibility and mission of every educator since ancient times to be proficient in "teaching" and "guiding" and to be responsible for and dedicated to "educating." The practical core of course-based ideological and political education is to actively explore and seek the relevance between subject-specific knowledge and ideological and political education content, subtly conduct ideological guidance, and through in-depth exploration of the educational elements contained in the taught courses, form "aggregation"; to find the points of intersection with each knowledge point, and organically integrate these elements into the taught knowledge points, forming "mixture"; to promote the deepening of students' ideological understanding and the gradual improvement of their values in education and teaching, and to penetrate moral education, achieving the goal of "ideological and political education entering people's hearts and silently moistening things" [2].

The future values of the entire society depend on the values of the youth, and the college stage is a critical period for the formation and establishment of values

among young people. Therefore, it is very important to cultivate the values of young people during this period. This article takes the students of computer science and technology major at Geely College as the research object and uses the course "Data Mining and Analysis" as an example to explore the talent development mode that focuses on "one basis", "three requirements", and "four integrations" under the background of computer technology and application-oriented talent cultivation. The article focuses on constructing a talent cultivation mode of "knowledge education", "ability training", and "value guidance", helping students establish correct worldviews, life outlooks, and values, gradually constructing a comprehensive, full-process, and whole-course ideological and political education pattern, and truly achieving the induction and guidance of values at the level of value concepts while imparting professional knowledge<sup>[3]</sup>.

## 2. "The One Foundation" of Ideological and Political Construction in Curriculum

Currently, with the rise of artificial intelligence and the Internet of Things, China's big data industry is maintaining a high-speed development trend. Governments at all levels and enterprises are vigorously promoting this industry, and significant breakthroughs have been made in technological innovation. The importance of data thinking is also becoming increasingly prominent. As a deep-level data analysis method, data mining technology mainly extracts, transforms, analyzes, and model processes data from massive business data in

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databases, and extracts key data to assist decision-making, which is widely used in finance, healthcare, industry, science, and other fields<sup>[5]</sup>. "Data Mining and Analysis" is a core course in computer science and technology, data science and technology, artificial intelligence, and other majors in universities, which is an interdisciplinary applied course that crosses multiple disciplines such as databases, statistics, artificial intelligence, machine learning, and pattern recognition. The course mainly introduces the basic concepts, principles, and methods of data mining, as well as various mainstream models and algorithms for implementing data mining. Through this course, students can understand the development trend of data mining, understand the role of data mining in today's computer field, familiarize themselves with the basic principles of data mining, master the key technologies related to data mining, and cultivate students' ability to process and analyze data. Based on the knowledge, skills, and literacy goals of the course, and in accordance with the characteristics of the discipline, the course development background, development process, status, and trends, the comprehensive education concept of integrating morality and intelligence and fostering students' virtues is adopted, and the elements of patriotic spirit, scientific spirit, innovative spirit, teamwork, professional ethics and other ideological and political education are excavated<sup>[7]</sup>.

### 3. The "Three Requirements" for the Construction of Ideological and Political Education in Curriculum

The integration of ideological and political education into a course can only achieve the goal of aligning professional courses with ideological and political education if the ideological and political content is closely related to the course content and synergistic effects are formed<sup>[4]</sup>. The construction of ideological and political education in this course is closely centered around the goal of "Three-Education Integration". Following the "three requirements", the ideological and political education resources embedded in the course are fully explored, the key points and difficulties of ideological and political education in the course are grasped, and the implementation of the teaching is carried out systematically with a focus on cultivating students' future professional ethics.

(1)Emphasize the exploration, activation, and utilization of ideological and political elements in the curriculum. Based on the characteristics of engineering majors and practical courses, the course construction should highlight the cultivation of the spirit of craftsmanship, which values truth-seeking, excellence, and innovative practices. Additionally, the course should foster students' spirit of social responsibility and dedication to the times, as well as their excellent qualities of diligence, rigor, and pursuit of excellence.◦

(2)Emphasize the precise grasp of the educational and instructional focus of ideological and political elements in the curriculum. The socialist core values should be integrated into the course teaching process. The ideological and political elements such as patriotism, scientific spirit, innovation consciousness, rule consciousness, legal thinking, professional ethics, and teamwork spirit should be incorporated into the course chapter content.

(3)Emphasize the professional qualities required for students' future work. Based on the characteristics of talent cultivation in the fields of computer science and technology, data science and big data, as well as the professional requirements of students' future careers, targeted exploration of the educational elements embedded in the course from the perspective of cultivating professional qualities can enhance the pertinence and effectiveness of the course's educational goals, and improve students' ability to develop their careers.

### 4. The "four integrations" of ideological and political education in curriculum construction

In the implementation process of the course ideological and political construction, guided by the teaching philosophy of integrating value shaping, ability cultivation, and knowledge impartation, the guidance of ideological values is incorporated into the main teaching activities such as curriculum standards, teaching design, classroom teaching, and teaching evaluation. This is achieved through the "four integrations" of course ideological and political construction, which is internalized as the students' spiritual pursuit and externalized as their conscious actions.

(1)Incorporating ideological and political elements into course standards. Currently, the development of artificial intelligence technology is booming. In 2017, the State Council released the "New Generation Artificial Intelligence Development Plan" and deployed the new generation of artificial intelligence at the national strategic level<sup>[9-12]</sup>. Algorithms such as machine learning and deep learning used in data mining are important methods and technologies for realizing artificial intelligence, and integrating them into the course content is essential. Therefore, for this course, national teaching quality standards and engineering education standards such as engineering and society, professional norms, personal and team development, lifelong learning, and innovative spirit are incorporated into the course standards, aiming to enhance knowledge and skills, cultivate diligent, studious, innovative, and honest qualities, and foster a serious and responsible attitude towards academic research and rigorous and meticulous comprehensive quality. The teaching content is aligned with the course standards, as shown in Fig 1.

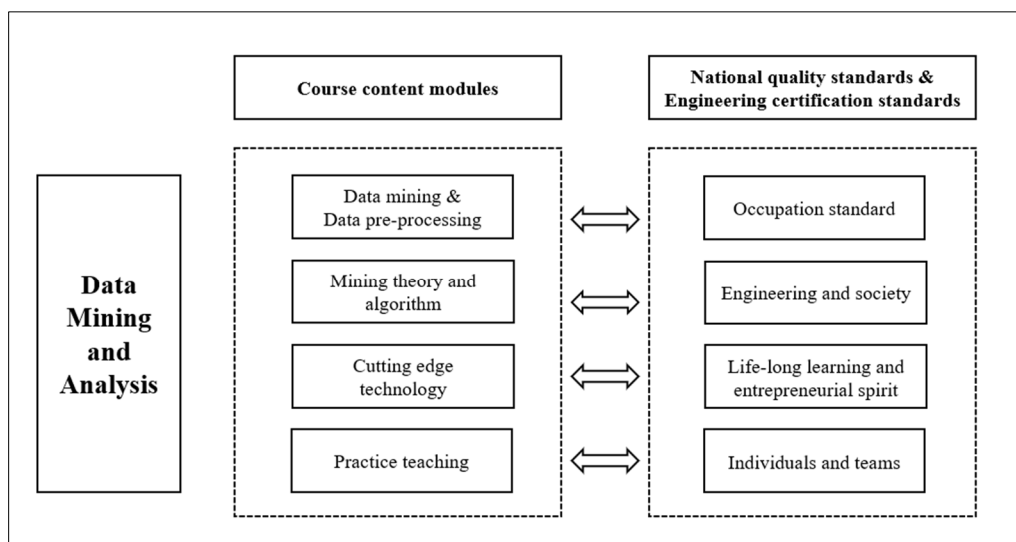


Fig. 1. The Integration of Teaching Content and Course Standards.

(2)Incorporating ideological and political elements into instructional design. The course "Data Mining and Analysis" covers two aspects: Python-related technologies and key data mining algorithms. The Python-related technologies include four modules: Python Basics, Scientific Computing Package Numpy, Data Processing Package Pandas, and Data Visualization Package Matplotlib. The key data mining algorithms also include four modules: Data Preprocessing and Regression Analysis, Neural Networks, K-means Clustering and Association Rules, and Deep Learning. Focusing on the eight teaching modules and laboratory units, as well as the "Three Requirements" of course construction, this article deeply explores the ideological and political elements contained in the course content. From the perspective of multiple disciplines involved in data mining, application to industry fields, and machine learning and deep

learning<sup>[13]</sup>, elements such as "patriotic devotion", "pursuit of excellence", "scientific and technological innovation", "seeking truth and pragmatism", "love for the party and the country", and "unity and collaboration" are integrated into the teaching design in a planned and purposeful manner. Based on the course content, the integration of ideological and political elements, timing, methods, and approaches are designed to ensure the unity of professional knowledge education and ideological and political education requirements. Such teaching design forms a positive and interactive system, in which the learning of disciplinary professional knowledge, practical application with theoretical connections, and the introduction of highly relevant ideological and political elements, transform into learning motivation. The teaching design integrating ideological and political elements in the course is shown in Table 1.

Table 1. Teaching Design of "Data Mining and Analysis" Course with the Integration of Ideological and Political Elements and Case Studies.

Elements of course knowledge	Elements of ideological and political education	Course case	Implementation time
1 Python basics	Pursue excellence	The Nan Rendong team created a giant of astronomical observation, a national treasure: the "Chinese Tianyan".	First week
2 Numpy	Continuous improvement		First week
3 Pandas	Seek truth from facts	The web crawler is a double-edged sword, which highlights the importance of legal awareness	Second week
4 Matplotlib	Love the party, love the country	Visualized epidemic map helps fight against the pandemic	Third week
5 Data preprocessing	Scientific spirit	Enhance data security awareness and maintain national security	Fourth week
6 Neural networks	Technological innovation	Tu Youyou developed artemisinin and saved millions of lives	Fifth week
7 Cluster classification	Patriotic fervor	From decision tree classification to understanding national policies	Fifth week
8 Deep learning	Renew and rejuvenate	Huawei has developed its own domestic mobile operating system called "HarmonyOS"	Sixth week
9 Practical teaching	Unity and cooperation	he Kafka producer and consumer pattern	Whole semester

(3)Integrating ideological and political education elements into classroom teaching. Incorporating the ideological and political education elements excavated into classroom teaching, through heuristic teaching methods such as creating value judgments and problem situations based on disciplinary knowledge content, enables students to recognize the ideological theories, methodologies, values, etc. behind the problems and knowledge in the process of thinking and problem solving, ultimately achieving value guidance for students in classroom teaching<sup>[8]</sup>.

Case 1: During the teaching of Unit 3 "Pandas for Data Processing", a web crawler case study was introduced to instill in students a sense of compliance with legal regulations. In the era of big data, web crawling is one of the common ways to obtain public data, and it refers to an automated program script that extracts web data according to certain rules. Web crawlers bring great convenience to data mining, but when used improperly, they may pose risks of violating laws and regulations, such as not complying with crawler protocols, obtaining sensitive information through long and narrow ratios, using the obtained information for illegal transactions or activities, and violating professional ethics. By using this case study, students can understand that technology is a double-edged sword, and only by using it correctly can it have a greater impact. This helps to instill in students a sense of compliance with legal regulations, moral consciousness, and correct professional ethics.

Case 2: When teaching the 7th unit on "Cluster Classification", a case study on the Gini coefficient is introduced to help students learn about the country's

poverty alleviation policies and guidelines through the decision tree classification algorithm. Decision tree classification is an algorithm for classification analysis in data mining. The commonly used algorithms for decision trees are ID3, C4.5, and CART, among which CART decision tree uses the "Gini index" as the measure of attribute selection. The Gini coefficient is one of the commonly used indicators internationally to measure income disparity among residents in a country or region. Starting from this point, the current wealth gap in China, the country's poverty alleviation policies, and the strategy of targeted poverty alleviation are introduced, helping students to understand the national situation and establish a firm belief in supporting national policies.

(4)Evaluation of Integrating Ideological and Political Elements into Teaching. The evaluation of teaching activities should judge the real or potential value from both the process and the results. Course assessment and evaluation is an effective means to enhance the effectiveness of ideological and political education in the course, as well as a critical link to measure whether the course reform has achieved the expected goals. The teaching evaluation of ideological and political education in this course is combined in three aspects: (1)combining evaluation with the learning outcomes of the course, (2)combining evaluation with the professional competencies that students possess upon graduation, and (3) combining evaluation with the career development and contribution to society of graduates, ultimately forming a comprehensive evaluation of the overall achievement of the ideological and political education goals of the course<sup>[14]</sup>, as shown in Table 2.

**Table 2.** Course Ideology and Politics Implementation Evaluation

Evaluation indicators	Evaluation time points	Evaluation methods	Evaluation purposes
professional competence	Ordinary and practical performance and final grades	Regular assessment: attendance, classroom performance, and practical projects Final assessment: final exam	Continuous improvement of course objectives
occupational competence	Five years after graduation	Graduate surveys, employer surveys, forums, third-party evaluations, and other methods	Continuous improvement of graduation requirements and educational goals
Social Contribution	Five years after graduation	Graduate surveys, employer surveys, forums, third-party evaluations, and other methods	Continuous improvement of graduation requirements and educational goals

## 5. Implementation Effectiveness of the Curriculum

In the context of "Great Ideological and Political Education", effectively integrating ideological and political elements into practical teaching of professional courses and achieving the organic combination of value guidance and professional knowledge dissemination is an effective means of cultivating high-level and high-quality talents for the country<sup>[15]</sup>. After a year of ideological and political implementation, it can be seen that compared to traditional teaching methods, the course that incorporates ideological and political elements has gained the deep

affection of students and achieved good results in course reform.

1.Student satisfaction rate reached 95%. The rich case-based teaching has reduced the monotony of learning professional knowledge, helping students deepen their understanding of professional knowledge and skills in a relaxed and pleasant atmosphere. Meanwhile, by incorporating ideological and political elements, students have gained a higher understanding of patriotism, scientific spirit, innovation spirit, and collaborative spirit in their thinking during the process of learning professional knowledge, internalizing them in their hearts and externalizing them in their actions. In terms of learning, students' attitudes, initiative, and self-discipline have been greatly improved, creating a trend of loving

learning, being able to learn, and knowing how to learn. In terms of ideology, through cultural guidance and value shaping, national identity and national pride have been enhanced, the world has been understood, China has been recognized, and national self-confidence and social responsibility have been strengthened.

2. The passing rate was 92%. In the first semester of the 2022-2023 academic year, a total of 461 students were enrolled in this course. The number of students who passed the final exam was 424, with a pass rate of 92%, which is 7% higher than the same period last academic year.

3. Over 100 people participated in social practice. In the academic year of 2022-2023, over 100 students participated in the "Three Villages Support" activity, an increase of 12% compared to the previous academic year.

4. Teachers' teaching and scientific research level has been improved. Based on the experience of ideological and political education in this course, the teaching team has been approved for one school-level special ideological and political project, three school-level teaching reform projects, and has published three papers on teaching reform. Additionally, this course has been established as a school-level branded course.

## 6. Conclusions

Cultivating virtue and educating people is the fundamental mission of education. To guide the ideological and moral values of contemporary college students, it is not enough to rely solely on courses in ideological and political theory as in traditional teaching methods. Instead, we must effectively integrate these values with disciplinary courses. By delving into the ideological and political elements embedded in professional courses, we can transform the training objectives of talent from solely imparting knowledge and mastering skills to a mode of education that unifies both knowledge and values. This creates a synergistic effect between knowledge dissemination and value guidance, which is more conducive to fulfilling the fundamental mission of colleges and universities to cultivate virtue and educate people<sup>[6]</sup>.

This paper takes the course of data mining and analysis as an example, upholding the spirit of ideological and political education in the course design. It proposes a course ideology and political education construction strategy based on "one foundation", "three requirements", and "four integrations." From the four aspects of course objectives, teaching design, classroom instruction, and teaching evaluation, this study conducts research and exploration, delving into the ideological and political elements that are integrated with disciplinary knowledge. The paper also carefully designs ideological and political education case studies and uses various teaching methods to integrate ideological and political elements into the course. Additionally, the paper reformed the course evaluation methods to promote the penetration of moral education, improve students' learning enthusiasm, enhance their professional knowledge and skills, stimulate their patriotism, help them establish correct worldviews, life values, and personal values, and inspire them to forge

ahead and strive for excellence, thus truly becoming new technological talents that are adaptable to the development of society.

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