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Research of Integration and Practice of Ideological and Political Education in Professional Course

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Abstract: Against the background of comprehensively promoting the construction of ideological and political education in the curriculum, and aim at the current situation where computer science professional courses are highly challenging, demanding practical application, predominantly based on foreign technologies and software, and lacking effective ideological and political education outcomes, the study is proposed to integrate the ideological and political education into professional courses. The database system design course is taken as the research object, to effectively explore ideological and political elements, design teaching methods, and adopt multidimensional assessment and evaluation method. The survey questionnaire results illustrates the effectiveness of the research results.

1. The necessity of integrating ideological and political education with professional courses

As a vital component of higher education, professional education currently faces prevalent challenges in ideological and political integration within specialized courses, particularly characterized by "rigid incorporation" and "super-ficialization" in professional curricula. This study focuses on the database system design course, leveraging constructivist learning theory to deconstruct the ideological and political mapping points throughout the database lifecycle----reinforcing legal awareness of user privacy protection during requirements analysis period, cultivating a meticulous professional attitude in the paradigm design phase, and embedding ethical decision-making competencies in transaction processing, to establish a "technical practice-value cognition-behavior cultivation" tripartite penetration mechanism and explore a path for implementing ideological and political education in courses that conforms to the cognitive laws of engineering. This implicit education model employs project-driven pedagogy to materialize core socialist values as data management norms.[1] Students gradually internalize correct technical values while addressing professional challenges such as "designing ACID properties for high-concurrency systems" or "balancing database performance and security" and so on.[2] The aim is to explore an implementation pathway for integrating ideological and political education into courses that aligns with engineering disciplinary cognition patterns. This endeavor not only provides a replicable paradigm for ideological and political education construction in similar technical courses

but also serves as a critical practice in response to China's "Network Power" strategy, nurturing digital talents who excel in both professional expertise and national patriotic feelings.

2. The Current Status of Curriculum Ideological and Political Education Development

Database system design is an important specialized course for the Information Processing direction of computer science major in the, offered in the first semester of the third year. It is built upon prerequisite courses such as Programming Fundamentals, Database theory Basics, Software Engineering, and Operating Systems. The course serves as both a foundation for the theoretical content of these prerequisites and an application of that knowledge in practice, with the two complementing each other. The course content is primarily based on the Oracle Database Management System (DBMS), covering the theories, techniques, and methods involved in it, as well as Oracle's architecture, basic operations, PL/SQL syntax, design, and applications. Corresponding to the graduation requirement indicators, the course aims to cultivate students' abilities in designing and developing solutions, utilizing modern tools, and ultimately solving complex engineering problems.

The course is designed for higher grade levels, and students have already possessed foundational computer science theories accumulated through specialized platform courses. Therefore, the curriculum places greater emphasis on cultivating students' practical abilities, balancing both theoretical and practical aspects. From the perspective of industry demand for database talent and aligned with graduation objectives, this approach integrates theory with practice, leverages case-driven and application-oriented methods, to trains students to master problem-solving approaches.

For computer science majors, the development of professional technology is crucial, and the courses mainly focus on foreign software and theories, which can easily weaken students' sense of national pride. Therefore, it is necessary to incorporate domestic technology cases to stimulate patriotism and innovation motivation. At the same time, computer students are science students, and ideological and political courses can help establish correct values and prevent deviations in their outlook on life. Moreover, the computer science discipline is intricately intertwined with societal progress, and integrating ideological and political education into the curriculum fosters students' humanistic spirit, craftsmanship ethos, and professional integrity.[3] Through subtle and implicit pedagogical approaches, this integration enhances students' comprehensive competencies while harmonizing knowledge dissemination with value cultivation. Consequently, embedding ideological and political elements into higher education teaching practices—aiming to cultivate multifaceted professionals equipped with both technical expertise and a sense of social responsibility—is imperative to meet the demands of national strategic development.

However, the current reality reveals several challenges in ideological and political education within higher education institutions. Both faculty and students tend to prioritize vocational skills and employability, perceiving ideological education as peripheral to their academic pursuits, which has led to its marginalization and insufficient attention. Many instructors lack the pedagogical competence to organically integrate ideological elements into their courses. Additionally, the exploration and integration of ideological elements remain superficial, often appearing forced and lacking systematic depth, which fails to resonate with students. Teaching methods are also monotonous, with ideological education lacking interactivity and practicality, resulting in low student engagement and suboptimal learning outcomes. Given these issues, research on the integration and practical application of ideological education with professional knowledge is of profound significance.[4]

3. Ideological and Political Education in Database System Design Courses

3.1. Ideological and Political Element Mining

The excavation of ideological and political elements focuses on integrating technical ethics, social responsibility, national sentiment and so on. Through curriculum design, students are cultivated to become technical talents in the new era who possess both professional skills and socialist core values.

3.1.1. Patriotism and Responsibility

In response to the long-term reliance on foreign database systems in China's core information infrastructure, the "de-IOE" initiative serves as a case study. For example, TravelSky Technology's high operational costs due to foreign database usage can inspire students' sense of mission in advancing domestic database technologies. By highlighting breakthroughs in Chinese databases like TiDB, students are encouraged to engage in foundational software development, answering the call for technological self-reliance and innovation.

3.1.2. Technical Ethics and Data Security

Oracle database management system involves extensive data processing, emphasizing awareness of data security and privacy protection. For example, in the data encryption module, introducing cases of medical information leaks can facilitate discussions on how to protect patient privacy through technical means, guiding students to understand the ethical boundaries of technology application. In the teaching of access control, simulating corporate data breach incidents can help analyze the impact of internal personnel misconduct, thereby strengthening professional ethics and norms.

3.1.3. Scientific Spirit and Team Collaboration

In the database design phase, taking normalization theory as an example, it emphasizes the "no rules, no square" rule awareness, extending to communication and responsibility-sharing in teamwork. For instance, through group projects simulating multi-source data integration, students cultivate the ability to solve complex problems while integrating integrity education, such as case analyses where data tampering leads to decision-making failures.

3.1.4. Craftsmanship Spirit and Pursuit of Excellence

It can be deeply integrated through performance tuning practices. Taking database optimization during e-commerce peak periods as an example, students are guided to pursue millisecond-level response improvements. This process emphasizes an extreme pursuit of technical details, such as optimizing SQL statements from 2 seconds to 0.2 seconds, which directly impacts user experience and embodies the professional attitude of "fighting for every millisecond" in craftsmanship. Additionally, by comparing solutions like indexes and partition tables, students' curiosity for technical depth is cultivated, inspiring a spirit of continuous improvement and innovation. Ultimately, through solving real business problems, the craftsmanship spirit is internalized into professional habits, enhancing the social responsibility and professional mission of technologists.

3.2. Instructional Method Design

The teaching methodology design of this course's ideological and political education must

revolve around the integration of knowledge transmission and value guidance.

3.2.1. Theoretical Teaching

In theoretical instruction, the case-driven approach is adopted, which leverages the development history of domestic database technologies (e.g., breakthroughs in OceanBase and TiDB) as teaching materials. By comparing the performance differences between Oracle and domestic databases, students are guided to understand the importance of technological self-reliance and innovation in technology, thereby fostering a sense of patriotism in scientific and technological endeavors. For instance, when teaching the database security module, the Regulations on the Protection of the Security of Computer Information Systems are incorporated to analyze the national security risks posed by data breaches. This approach strengthens students' legal awareness and sense of social responsibility.

3.2.2. Practical Teaching

The practical teaching adopts project-based learning (PBL), designing a comprehensive training program titled "Enterprise-Level Database Optimization." Students are divided into teams to simulate real-world work scenarios, where they address practical challenges such as high-concurrency query optimization and disaster recovery backup solutions. Throughout this process, teamwork and craftsmanship are seamlessly integrated into the learning experience. To enhance organizational skills, a rotating team leader system is implemented, while the code review phase emphasizes a "zero-tolerance" approach to meticulousness, fostering a professional ethos of continuous improvement. Additionally, the Oracle "de-IOE" (de-IBM, Oracle, EMC) case study is introduced to stimulate discussions on independent and controllable technology strategies amid technical blockades. This initiative aims to guide students in reflecting on the alignment between individual skill development and national technological demands.

3.2.3. Assessment

Finally, the assessment adopts a multi-dimensional evaluation framework, integrating the cultivation of diverse competencies and qualities into the scoring system. For instance, students are required to justify data privacy protection strategies when designing database architectures, thereby fostering engineering ethics awareness. Additionally, through formats such as classroom debates and industry expert lectures, students broaden their international perspectives and enhance their understanding of the global technological competition landscape. The assessment components of Database system design are shown in table 1.

Table 1: Assessment components of database system design.

Assessment components	Score value
Class Participation	10
Assignments	10
Laboratory Work	10
Practical Training	20
Final Examination	50

The overall design prioritizes subtlety and implicit integration, seamlessly embedding elements such as patriotism and professional ethics into technical details to achieve a "silent nurturing" educational effect. Teachers are required to continuously update the teaching case repository, incorporating the latest technological trends (e.g., the integration of AI with database systems) to ensure the course remains contemporary and forward-looking.

4. Effective analysis

A questionnaire survey was conducted to collect students' feedback on the teaching model, with 165 participants. The survey results, as shown in Table 2.

Table 2: Questionnaire survey result on the teaching model.

survey content	Yes	No
Helps stimulate enthusiasm for learning the course	159	6
Helps improve independent learning ability	152	13
Helps enhance problem-solving skills	150	15
Helps strengthen patriotic sentiment	158	7
Helps enhance hands-on practical ability	157	8
Helps fosters teamwork	158	7

It indicates that the vast majority of students are quite satisfied with the ideological and political education teaching model, which has significantly enhanced their engagement and understanding of core values, as it effectively integrates theoretical learning with practical application.

5. Conclusions

Taking the course database system design as the research object, by implementing the above teaching reforms into the curriculum, we aim to achieve a deep integration of ideological and political education with professional education. It should be done to explore ideological and political elements such as technological ethics, social responsibility, patriotic sentiments, and craftsmanship, while reforming teaching methods by adopting case-driven theoretical instruction and project-based learning for practical training. Simultaneously, a multi-dimensional assessment system is implemented in the evaluation process to comprehensively evaluate students' capabilities across various dimensions. The method proposed in this paper may be applied to other computer courses with high practical requirements.

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