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Exploration of the Construction Path of Ideological and Political Education in Software Technology Courses at Vocational Colleges

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Abstract: The *Guidelines for the Construction of Ideological and Political Education in Courses at Institutions of Higher Learning* emphasizes that "the construction of ideological and political education in courses is an important task for comprehensively improving the quality of talent cultivation" and "clarifying the target requirements and key content of the construction of ideological and political education in courses." In vocational colleges, as an important discipline in the field of information technology, the construction of ideological and political education in software technology courses is of great significance for cultivating students' comprehensive qualities and establishing correct values. Based on sorting out the core literacy of the construction of ideological and political education in software technology courses, this article actively explores its construction path, hoping to provide references for relevant educators.

Keywords: Software technology major; Ideological and political education in courses; Vocational colleges

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1. Introduction

With the rapid development of information technology, the software technology major is playing an increasingly prominent role in vocational colleges. As an important base for cultivating high-quality information technology talents, vocational colleges should not only impart professional knowledge and skills in software technology teaching but also pay attention to students' ideological and political education, achieving the organic unity of knowledge imparting and value guidance [1]. Therefore, exploring the construction path of ideological and political education in software technology courses at vocational colleges is of great significance for improving the quality of talent cultivation and promoting students' all-round development. This article will start from the core elements of the construction of ideological and political education in courses and deeply analyze the specific implementation paths of the construction of ideological and political education in software technology courses.

2. Core elements of the construction of ideological and political education in software technology courses

Essentially, the construction of ideological and political education in software technology courses means integrating the core ideological and political education elements that are most needed to be shaped and most relevant to the major into the teaching of professional courses, so as to guide students to establish correct values, improve their thinking abilities, and promote the innovation and renewal of educational concepts. Combining the characteristics of software technology courses and the educational goals, the core literacy of the construction of ideological and political education in its courses is sorted out as follows.

2.1. Political identity and patriotic sentiment

Political identity and patriotic sentiment are the fundamental elements in the process of ideological and political education in software technology courses. With the development of information technology and its deep integration into various fields and industries, it has become a key area of national strategic competition. In the teaching process of software technology courses, teachers should guide students to deeply understand the connotation of "self-reliance and self-improvement in science and technology" in the new era. For example, by guiding students to compare the technical development histories of Windows and the domestic Kylin operating system, and analyzing the innovative path of Huawei's Hongmeng system in breaking through the Android ecosystem blockade, students can fully understand the strategic significance of independent and controllable core technologies [2]. In the teaching process of "Database Technology," teachers can introduce the development case of the "Health Code" system, explaining how China's independently developed big data platform for epidemic prevention and control processed an average of 60 billion pieces of data per day during the epidemic, covering 1.4 billion people and effectively supporting social governance, thus fully demonstrating the advantages of the socialist system with Chinese characteristics [3]. In addition, teachers can have students compile the "Timeline of China's Scientific and Technological Rise" project based on major scientific and technological achievements such as the Beidou Navigation System and quantum communication, and present the development context of national science and technology through visual programming technology, so as to stimulate students' national pride [4]. Teachers can also have students participate in the practical task of designing "Red Code," and require them to integrate red culture elements when writing the modules of the government service platform, such as using Python to draw a dynamic pattern of the Party emblem, thus achieving the deep integration of professional skills and value guidance.

2.2. Professional ethics and legal awareness

The professional behaviors of software technology talents directly affect information security and social stability, so the cultivation of professional ethics and legal awareness is of particular urgency. In the Network Security Technology course, teachers can introduce cases such as the "Panda Burned Incense" virus case and the Facebook data-leakage incident, and analyze the relevant provisions of the "Network Security Law" and the "Data Security Law" to strengthen students' awareness of the legal bottom line [5]. In the Software Engineering course, teachers can introduce the "Microsoft Windows XP End-of-Support Event" and guide students to discuss how to balance user rights and social responsibilities when an enterprise terminates the maintenance of an old system due to commercial interests. Students are required to write an ethical decision-making report based on the "Measures for the Management of Software Products" [6]. Regarding artificial intelligence ethics issues, an "Algorithm Bias Detection" experiment can be set up in the Machine Learning course. Teachers can guide students to use public datasets to verify the recognition-difference rates of face-recognition systems

for different ethnic groups, enabling them to understand the necessity of writing fairness-optimized code. On this basis, schools can establish a "Technical Ethics Review Committee," with professional teachers, legal consultants, and enterprise experts jointly evaluating students' projects and assessing the compliance of app development plans involving user privacy collection.

2.3. Scientific morality and innovation spirit

In view of the academic misconduct risks, such as code plagiarism and data fraud, in the software technology field, it is necessary to construct a cultivation system for scientific morality and innovation spirit. In the Fundamentals of Programming course, teachers can deploy a code-plagiarism-checking system (such as MOSS) to detect the similarity of final-term projects. Students with a repetition rate exceeding 30% need to restructure their code and participate in academic-norm training. Teachers can also carry out the Innovative Algorithm Marathon activity, requiring students to use genetic algorithms to solve traffic-congestion problems [7]. In the teaching of "Introduction to Artificial Intelligence," teachers can guide students to compare the technical differences between AlphaGo and the domestic Go AI "Jueyi," and analyze the algorithm innovation points of the open-source papers of the DeepMind team, so as to cultivate students' awareness of respecting intellectual property rights. A "Contribution-point System for Open-source Communities" can be established, and participation in international open-source projects such as Apache and Linux can be included in the course assessment.

2.4. Professional morality and work ethic

In view of phenomena such as the "996 work system" and "age anxiety" in the software industry, it is necessary to further strengthen the cultivation of professional morality and work ethic among software technology majors. In the Software Testing Technology course, teachers can simulate the real-world stress-testing scenarios of enterprises: execute 2,000 automated test scripts continuously for 8 hours and record the change curve of students' error rates, guiding them to understand the balance between efficient work and reasonable rest. Teachers can also introduce the "Programmer's Occupational Health" module into the course content, explain the preventive measures for tendinitis and cervical spondylosis, and organize the "Standing-Style Programming" experience activity. In the Project Management course, an "Agile Development Practice" can be set up, requiring students to complete the development of the "Campus Food Delivery System" in groups within two weeks and report their work progress and difficulties daily while standing, so as to cultivate team cooperation and stress resistance abilities [8]. Teachers can carry out the activity of "Model Worker Engineers Entering the Classroom," alumni who have won the title of "National Technical Expert" are invited to share their experiences in software debugging and tell stories of continuous problem-solving. A "Code Craftsman" evaluation system can be established, with code-standardization (in accordance with the PEP8 standard), unit-test coverage rate (required to reach over 85%), and document integrity included in the assessment indicators, and an "Excellence Award" can be issued to students.

3. Construction paths of ideological and political education in software technology courses

3.1. Constructing a "trinity" of ideological and political education in the course system

The construction of ideological and political education in software technology courses requires the construction of a coordinated "trinity" system of "goal leading, curriculum restructuring, and resource supporting." First, strengthening the goal leading of top-level design. According to the *Guidelines for the Construction*

of Ideological and Political Education in Courses at Institutions of Higher Learning and combined with the professional talent cultivation plan, a three-dimensional matrix of "knowledge goals, ability goals, and ideological and political goals" is formulated [9].

Secondly, promoting the structural restructuring of the curriculum system. It is necessary to break the traditional disciplinary barriers and integrate ideological and political elements into the entire chain of "basic courses, core courses, and expansion courses"; embed the education of the history of science and technology in professional basic courses, such as China's contributions to the development of computers; add a "Technical Ethics" special module to core courses, such as discussing algorithm bias issues in the Python Data Analysis course; develop "Red IT" elective courses in expansion courses [10]. On this basis, an inter-course ideological and political linkage mechanism is established. For example, the "Software Testing" and "Professional Accomplishment" courses can jointly carry out the theme discussion of "Defect Repair and Sense of Responsibility."

Finally, improving the resource-supporting system. Three types of resources are built: an "ideological and political education in courses case library," a "virtual simulation project library," and a "school-enterprise collaborative education platform."

3.2. Innovating the "multi-teacher collaboration" teaching mode

The construction of ideological and political education in software technology courses can be achieved by establishing a multi-teacher collaborative system mechanism of "professional course teachers + ideological and political teachers + enterprise mentors," breaking the "two skins" of professional teaching and ideological and political education.

Firstly, building a diverse teaching team. Schools can form a mixed teaching team consisting of teachers from the ideological and political department, software technology professionals, and enterprise engineers to carry out collective lesson preparation for "technology + ideological and political education" [11].

Secondly, implementing a multi-teacher co-teaching model. At key teaching nodes, implement multi-teacher linkage teaching, and carry out "knowledge explanation + technical analysis + ideological sublimation" [12]. Taking the core course Mobile Application Development as an example, when teaching the "principle of minimizing permissions," the professional course teacher can explain the Android architecture, the ideological and political teacher can analyze the value deviation behind the "excessive power claim of app," and the enterprise mentor can share the formal software development process, thus constructing a "multi-teacher collaboration" teaching mode, so that students can not only firmly grasp professional skills, but also deeply improve their ideological and political literacy.

Thirdly, deepening the integration of industry and education and promoting collaborative education. Transform real enterprise projects into carriers of ideological and political education, and establish a transmission chain of "project practice professional norms value cultivation." For example, in the development of the "Smart Agriculture Internet of Things System" through school enterprise cooperation, enterprise mentors guide students to overcome the technical difficulties of sensor networking and simultaneously implant "technology-assisted agriculture" responsibility education. In the process of contributing code to open-source communities such as OpenHarmony, enterprise mentors emphasize the open-source spirit of "open sharing, collaborative innovation" through code review, enabling students to achieve synchronous improvement of technical skills and professional spirit in real production environments.

3.3. Creating a virtual-real integration ideological and political education scenario

In view of the strong abstractness of software technology and the difficulty of integrating ideological and political education, it is necessary to construct a three-dimensional education scenario of "virtual simulation + on-site experience + digital platform." In terms of virtual scenario construction, develop VR/AR teaching resources with ideological and political connotations. For example, use virtual simulation technology to restore the "Loongson Processor R&D Laboratory" to let students "immersively" experience the process of core technology research and development. Design the "Data Ethics Maze" interactive game, and through role-playing as data engineers, hackers, regulators, etc., students can deal with moral dilemmas such as privacy leakage and algorithmic discrimination, and strengthen their ethical awareness through virtual decision-making [13].

In terms of on-site education scenarios, create a linkage mechanism for "three types of classrooms." Build an "IT Culture Corridor" on campus to display the technological evolution history from the abacus to the quantum computer, highlighting the main line of "scientific and technological innovation driving the progress of civilization." Establish red-IT practice bases off-campus, organize visits to national super-computing centers and Beidou satellite industrial parks, and carry out the theme research of "The Power of China in Code." Build an "Online Programmers' Values Discussion Area" in the cloud, and conduct debates around hot topics such as the "996 work system" and the "35-year-old career crisis" to form a value-shaping field that integrates online and offline.

In terms of digital platform empowerment, construct an intelligent ideological and political management system. Use big data technology to collect students' learning behavior data, such as code submission records and online discussion content. Through an emotion analysis model, identify students' value orientation tendencies, and automatically push warning cases to students with behaviors such as "code plagiarism" and "negative collaboration." Develop a "Growth Record of Ideological and Political Energy Values," convert practical experiences such as participation in open-source projects and technical public welfare services into visual points, and stimulate students' internal motivation to actively construct values.

3.4. Establishing a multi-element coupling evaluation mechanism

The evaluation of the effectiveness of ideological and political education in courses needs to break through the single-knowledge assessment model and construct a coupled evaluation system with "multiple subjects, multiple dimensions, and diverse methods." In terms of evaluation subjects, a four-dimensional linkage of "students' self-evaluation, teachers' mutual evaluation, enterprise participation in evaluation, and third-party evaluation" is formed. For example, in the Software Engineering Practice course, students record their ethical thinking in technical decision-making through the "Integrity Development Log." School-enterprise dual mentors jointly score from three dimensions: code standardization, team cooperation, and social value. Industry associations are introduced to certify the compliance of project results to ensure the objectivity of evaluation.

In terms of evaluation content, a three-level index system of "value cognition, emotional identification, and behavioral externalization" is established. In the assessment of the Front-end Development course, not only is the mastery of HTML5 skills tested, but also the service awareness is examined through practical projects, and the social benefits are evaluated based on the user feedback after the project is launched. On this basis, teachers can also develop an "ideological and political radar chart" evaluation tool to generate student growth portraits from six dimensions, including political literacy, legal concept, and innovation spirit, so as to achieve precise education [14].

In terms of evaluation methods, a combination model of "process evaluation, value-added evaluation, and

development evaluation" is adopted. In addition to traditional written examinations, "ideological and political education in courses defense meetings" (displaying the values reflected in technical projects) are added, "growth portfolio evaluations" (collecting process materials such as ethical reflections in code annotations and technical public-welfare certificates) are implemented, and "value concept tracking surveys" of graduates (analyzing the degree of fit between career choices and national strategic needs) are carried out. The evaluation results are fed back to the revision of the talent cultivation plan, thus forming a dynamic optimization mechanism of "evaluation–improvement–re-evaluation" to ensure that the construction of ideological and political education in courses is always in line with industry development and national needs.

4. Conclusion

Vocational college software technology majors can strengthen the construction of ideological and political education in courses by constructing a "trinity" ideological and political education in courses system, innovating the "dual-teacher collaboration" teaching model, creating a "virtual-real integration" ideological and political education scenario, and establishing a "multi-element coupling" evaluation mechanism. This can cultivate students' political identification and patriotic sentiment, enhance their professional ethics and legal awareness, scientific morality and innovation spirit, so as to better meet the continuous development of information technology and the growing national demand for software technology talents, and contribute to the cultivation of more new-era software engineers with noble virtues and excellent skills.

Disclosure statement

The authors declare no conflict of interest.

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