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Curriculum Ideological and Political Teaching Practice Under the Framework of "Three Layers and Three Dimensions"

-- Take Industrial Robot Workstation Integrated Application Technology Course as an Example

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Abstract: Combined with the new requirements of regional industrial transformation and upgrading for talents, the course defines the ideological and political construction idea of "culture leading, innovation first, ingenuity casting soul", systematically constructs the ideological and political content framework of the course from the three levels of individual, industry and country, and explores the "3721" teaching process under the guidance of ideological and political integration in the "focusing" design. Through the whole process of ideology and politics in and out of class, online and offline, students are guided to integrate the cultural quality of design, the innovative concept of integration, and the exquisite skills of installation in the process of project implementation, so as to gradually cultivate students' humanistic quality, industrial values and craftsman spirit.

Keywords: Curriculum; Ideology and Politics; Focus; Humanistic Quality; Craftsmanship Spirit.

1. Introduction

"Ideological and political education " refers to the positive influence of ideology and social values on educatees by educators according to the ideological requirements of the state and society, so as to encourage educatees to internalize social ideological and moral education into personal ideological and moral education, so as to achieve the value-guided education effect [1]. "Ideological and political education" can be understood as the integration of ideological education and political education. Ideological education refers to the education of the world outlook, and politics is mostly related to the content of ideology. Political education refers to the education of the political position of the educated by the educator according to the development requirements of the country and society, so as to promote the comprehensive and social development of the educated [2]. The essence and soul of ideological and political education lies in the process of "in order to conform to the needs of social development and realize personal self-growth, the educatees take the initiative to internalize the core social values in mind and externalize in practice, consciously improve their own ideological literacy, political literacy, moral literacy and cultural literacy, and realize comprehensive and sustainable self-development". The educational concepts upheld by all schools include the educational concept of " cultivating moral character and promoting personal growth. " And the educational values of "All-around development of moral, intellectual, physical, aesthetics and labour education", Among them, " moral " refers to moral education and moral cultivation, which is synonymous with "ideological and political education".

The General Secretary emphasized many times that "all courses should guard a certain channel and plant a good field of responsibility, so that all courses and ideological and political theory courses should work in the same direction and form a synergistic effect." [3] However, the construction of new engineering is the support of our education power strategy, which is reshaping our international competitiveness [4]. In addition to professional ability and general quality, new engineering talents must possess the characteristic qualities of new engineering, such as the devotion of science and technology to the country, interdisciplinary and systematic thinking [5]. However, engineering colleges often lay stress on the cultivation of professional qualities and skills. It is easy to ignore the mining of ideological and political education elements in professional education, leading to the phenomenon of "hard integration" and "superficial" in curriculum ideological and political education to some extent [6]. This paper takes the ideological and political integration of industrial robot workstation integrated application technology course as an example, combined with the new requirements of regional industrial transformation and upgrading for talents and industrial robot application integration post demand. With the perspective of "culture leading, innovation first, originality casting soul" as the entry point of ideological and political integration, we explore the online and offline mixed course ideological and political teaching practice and multiple evaluation system, and promote students to pay attention to the improvement of ideological and political literacy.

2. Mining Ideas for Ideological and Political Elements of the Curriculum

The Industrial robot technology major of Wenzhou Polytechnic adheres to the educational philosophy of "cultivating artisan talents of new technology according to the regional demand for new technology". Based on the talent demand of "intelligent upgrading of pillar industries" in local region and the new concept of digital design and development of robot application industry, it carries out the ideological and

political teaching reform of curriculum deeply. The goal of ideological and political construction of the course is to cultivate highly skilled talents with regional characteristics, industrial values with pragmatic characteristics and craftsman spirit with the characteristics of The Times.

Through the design of typical application projects with progressive difficulty, the course enables students to gradually achieve the goal of knowledge and skill quality of robot positions. They can accurately design control schemes, accurately configure peripheral parameters, carefully develop control programs, fine-tune robot workstations, and lean to help enterprises reduce costs and increase efficiency.

The ideological and political content of the course forms whole from the three levels: individual, industry and country. The ideological and political content is built around the inheritance of humanistic spirit with "mutual help, mutual trust and win-win" as the core, the pursuit of industrial value with "precise control and practical effect" as the core, and the home-country feelings with "craftsman spirit" as the core. From the three dimensions of cultivating robot integrated application talents, namely, humanistic qualities, innovative concept and exquisite skills, six ideological and political elements, namely, teamwork, honesty and friendship, innovation and effectiveness, standardization and pragmatism, lean and focus, love of post and patriotism, are extracted and systematically integrated into the course content, organically combined with the project, and progressive layer by layer. According to the task requirements, it is decomposed into measurable and evaluable specific indicators and incorporated into the evaluation system to design and construct a curriculum ideological and political content framework of "three levels, three dimensions, six elements and six evaluations" as a whole. (See Figure 1).

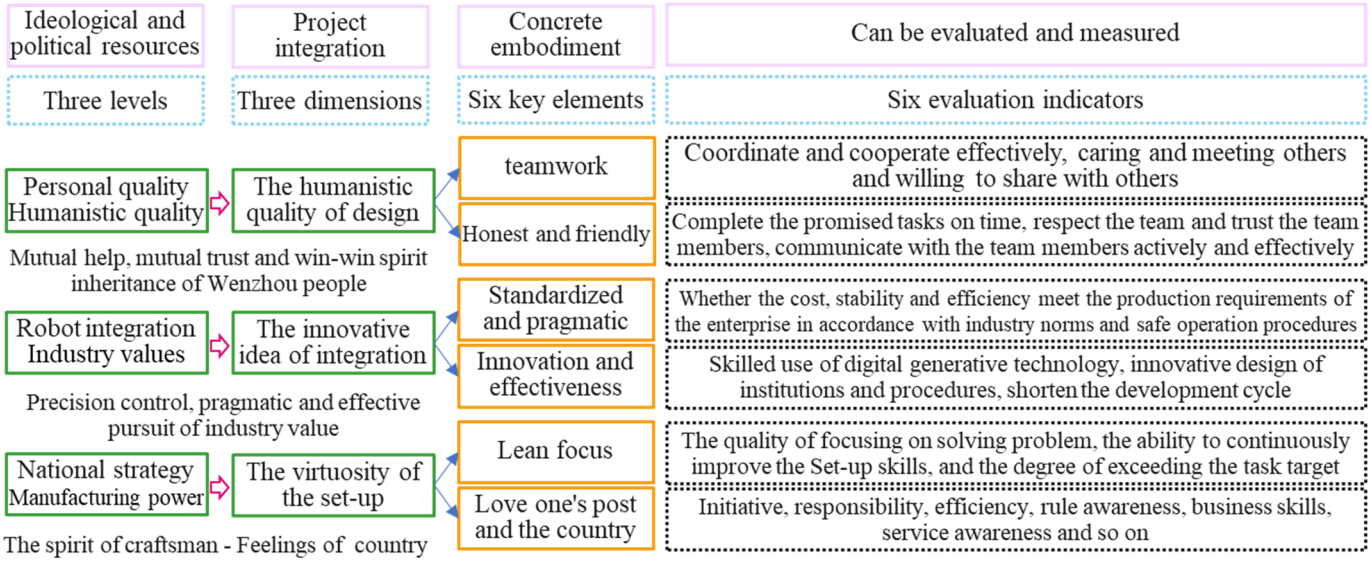


Figure 1. Curriculum ideological and political content framework

3. Application and Practice

3.1. Reconstruction of Curriculum Content and Integration of Ideology and Politics

The course team accurately meets the industrial intelligent upgrading needs of "machine replacement" in regional industries, and restructures the teaching content into teaching projects closely related to the technological transformation and upgrading of production lines such as robot palletizing, handling and sorting according to the typical application characteristics of "single machine application - workstation integration - assembly line collaboration" of industrial robots. "Ouyue culture, industry values, artisan shaping" is integrated into the project content, and the course ideological and political construction ideas of culture leading, innovation first and ingenuity casting soul are constructed, aiming at training students to become technical and skilled talents with "precise control, pragmatic and effective" characteristics in the field of robot control integration. Enable students to become high-quality talents who can accurately design control schemes, accurately configure peripheral parameters, carefully develop control programs, fine-tune robot workstations, and lean to help enterprises reduce costs and increase efficiency. As shown in Figure 2.

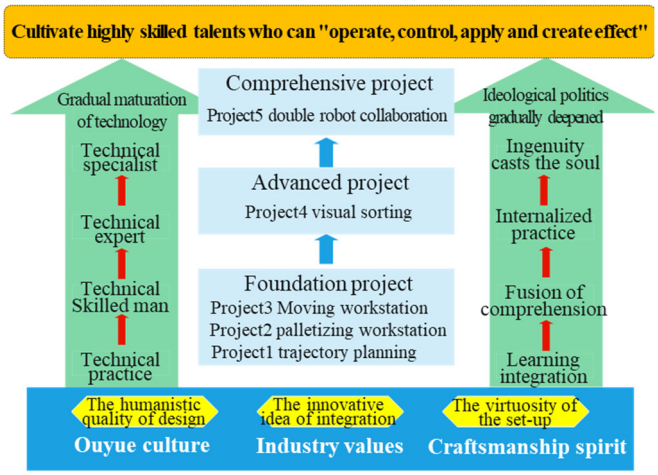


Figure 2. Course content reconstruction and ideological and political construction direction

The curriculum closely revolves around the curriculum ideological and political content framework of "three levels, three dimensions, six elements and six evaluations". From the aspects of technology, standards, norms and cooperation, the curriculum organically integrates the humanistic quality of "mutual help, mutual trust and win-win", the industrial values of "precise control, practical and effective" and the values of "craftsman spirit" into each teaching project. See Figure 3.

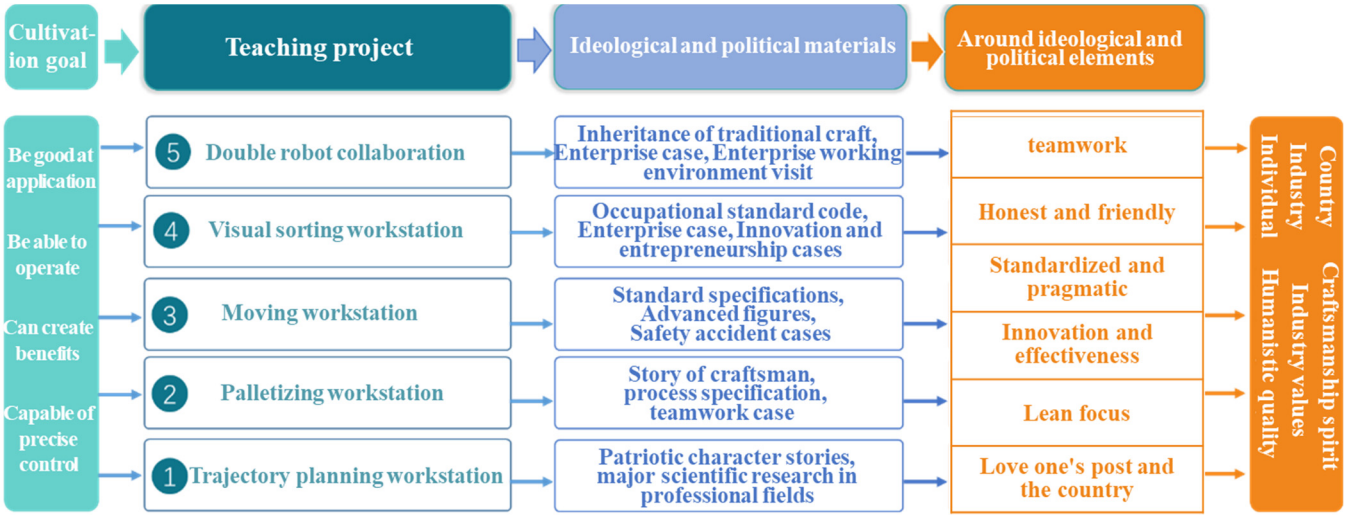


Figure 3. Integration points of ideological and political elements

Closely surrounding the six ideological and political elements, the school takes "humanistic background of Wenzhou spirit, industry values of innovation and efficiency, craftsman spirit of machine replacing people to help manufacturing a powerful country" as the main source of ideological and political materials, closely combined with the professional teaching process, focusing on design, interweaving, value-added evaluation to strengthen the strength of value leading. (Figure 3)

(1) Focusing on each ideological and political element, combining with the guidance of professional content, repeatedly reflecting the same ideological and political element in multiple teaching objectives, throughout the whole teaching implementation process;

(2) Focusing on the development of each project from multiple perspectives, so that the value of multiple ideological and political elements can be fully realized in the carrier of the same teaching project;

(3) Focusing on the value-added evaluation of ideology and politics, taking the achievement degree of ideological and political goals as the core, designing a process assessment combining knowledge and skills to ensure the integration of value building, knowledge imparted and ability cultivation.

Through positive and negative education cases, animation videos, situation creation and other forms, through personal experience, tutor's message and other ways to cleverly enter into ideological and political points, and through student self-evaluation, student mutual evaluation, teacher comments and other links to ensure the realization of value building, knowledge imparts and ability cultivation, to implement the goal of moral cultivation.

3.2. Ideological and Political Teaching Practice

3.2.1. Integration of Curriculum Ideology and Politics with Teaching Process

Relying on the "trinity of production, education and research" teaching platform of school-enterprise integration, the "3721" teaching process is carried out under the guidance of ideology and politics. Oriented by solving practical problems of enterprises, teaching is organized according to the principles of "preliminary study before class, improvement breakthrough during class, development incubation after class". Before class, the actual problems of enterprises are connected through real cases, and the key points of knowledge and skills are sorted out. In this class, we will master the methods needed to solve practical problems through 7 steps and 5 exercises, and continue to hone our skills. After class, relying on real project practice of innovation platform, we can apply what we learn to solve practical problems of enterprises and incubate technological innovation achievements.

This paper introduces the specific teaching process by taking the robot program download and calibration combined with task-virtual-real as an example.

(1) Before class, complete the preliminary study through "3" steps of "self-study, self-test and self-training", such as case discussion, error discussion, pre-class meeting, etc., and gradually strengthen the awareness of honest cooperation and mutual help

Taught myself typical cases of robot program calibration on the innovation platform, carried out self-study and self-test of relevant knowledge on the course platform, explored practical training tasks on the twin platform, and got familiar with the basic knowledge and methods of tasks.

(2) Improve skills through "7" steps and 5 "practice" links in class to break through major and difficult points and establish a sense of standard operation

1) Import: case video import, set the task situation to arouse interest, determine the joint adjustment of robot workstation as the focus, and the calibration of robot offline program as the difficulty.

2) Preliminary training: Guide the students to analyze the reasons and solutions of inaccurate robot positioning and fill in the loose-leaf textbook in order to first set up motor assembly failure cases.

3) Drill: Play motor assembly trajectory animation, demonstrate the relationship between coordinate calibration and trajectory change, and encourage students to patiently analyze the influence of coordinate system change on robot trajectory.

4) Repractice: students share debugging schemes, standardize debugging steps, and master point calibration methods.

5) Correction: Digital twinning technology is applied to demonstrate the difficulties and solutions of point compensation calibration trajectory when the virtual design control program downloads the actual robot hardware equipment.

6) Competitive training: In accordance with the debugging

specifications, the team will carry out practical operation in an orderly manner, and the teaching tracking system will record the whole process to support multiple evaluation.

7) Evaluation: intra-group, inter-group, teachers and other aspects of the evaluation of operational norms and task completion, through the form of scores to promote learning.

(3) After class, "2+1" will be used to strengthen skills and improve practical and innovative ability

"Consolidate and expand" after class: evaluate the achievements in the class according to the standard of X certificate, and students check the omissions and fill in the gaps to consolidate the calibration knowledge and debugging methods; Carry out twin programming debugging practice of micro switch visual sorting technical reform project on innovation platform. An evaluation score of 85 or above will enter the "incubation" stage.

After class "incubation": select and participate in competition projects, innovation projects, technical improvement projects, etc.

3.2.2. Integration of Curriculum Ideology and Politics with Evaluation

The ideological and political construction of the course starts from the whole course. On the basis of the completion of the teaching design, the content of the course is sorted out, and the core of ideological and political cultivation throughout the whole course is formed by combining the content. Then the ideological and political cultivation is gradually deepened through the development of projects and tasks one by one.

Therefore, following the principle of promoting learning by evaluation and thinking by evaluation, we should systematically build a comprehensive evaluation system of diversity and coordination, and carry out value-added evaluation of ideological and political quality throughout the whole process of teaching construction. In the assessment and evaluation of the overall design, we should pay attention to the orientation and professionalism of the evaluation content and method. In the content design, it not only attaches importance to professionalism, but also reflects the guidance of ideological and political elements, as shown in Table 1. For example, the collaborative participation of production and education personnel in the evaluation, the pragmatic standards of the evaluation of enterprise mentors, the effectiveness of teachers' evaluation goals, and the participation of students in the evaluation process, promote students to shape the ideological and political connotation in the continuous cooperation to explore and solve practical problems. The key is to attach importance to value-added evaluation and promote students to gradually improve their ideological and political literacy.

Table 1. Assessment form

module	link	Evaluation content	Evaluation subject	Evaluation means	Assessment intention	Assessment score
Knowledge objective	Before class	Robot knowledge self-training, calibration method self-study test scores	teacher	Platform scoring	Students' pre-class knowledge learning	10%
	In class	Ask questions and score group answers	teacher	Platform, scoreboard	Improve the mastery of key knowledge	5%
	After class	Knowledge application: 1+X skill level off-line calibration and debugging method knowledge test after class	teacher	Platform, scoreboard	Strengthen the knowledge structure combing	10%
Capability objective	Before class	Knowledge application: 1+X skill level off-line calibration and debugging method knowledge test after class	teacher 1+X assessor	Platform, scoreboard	Urge students to master skills	10%
	In class	Two calibration methods are applied to calibrate the robot program	Teachers and students	scoreboard	Students master and apply skills to cultivate students' rigorous and meticulous spirit	20%
	After class	Extended tasks: Calibration optimization and testing of off-line program for technical improvement case of platform visual sorting workstation	Teachers and business mentors	scoreboard	Enhance the ability to use knowledge	15%
Ideological and political literacy goals	Before class	Student participation in team activities before class	team	scoreboard	Members supervise and promote each other	5%
	In class	Initiative, cooperation, discipline, safety performance	Teachers and Enterprise mentor	scoreboard	Ideological and political accomplishment, team consciousness	25%
	After class	Students overcomplete the programming test of the twin platform case task to get the enterprise task or participate in the incubation link			Enhance innovation and practice ability	

3.2.3. Integration of Curriculum Ideology and Politics with Teaching Methods

The course adopts positive and negative education cases, case inspiration, group cooperation, operation demonstration, cooperative exploration, post simulation and other forms. Through personal experience, tutor's message and other ways, it cleverly enters into ideological and political points. Through the links of student self-evaluation, student mutual evaluation, teacher comments and so on, it ensures the integration of value building, knowledge imparts and ability cultivation, and implements the goal of cultivating virtues and cultivating people.

Table 2. Ideological and political integration and teaching methods

Serial number	Teaching content overview	Curriculum ideological and political education goal	Teaching method
1	Project 1 trajectory planning Learn the basic motion instruction of robot, master the trajectory planning method, and realize the generation and verification of robot engraved trajectory.	Honest and friendly teamwork	Case inspired, group collaboration The online platform of the course pushed the case study of a Wenzhou family to guide students to pay attention to teamwork, mutual help and trust when completing team tasks
2	Project 2 palletizing workstation Learn palletizing instruction, master material offset array setting, realize material palletizing.	Standardized and pragmatic	Operation demonstration, case inspiration Watch the "Safety accident warning record" infected students, teachers demonstrate non-standard operation leads to palletizing workpiece collapse caused by safety accidents, guide safety standard operation
3	Project 3 Moving workstation Learn robot interface configuration, master the integrated control method of positioner and feed turntable, and realize loading and unloading handling.	Lean focus Love one's country and post	Operation demonstration, case inspiration Through the robot and PLC interface to precise docking, the introduction of "great power craftsman" Han Chao deep-sea precise operation robot operation, cut into the rigorous, focused, love the ideological and political point
4	Project 4 visual sorting Learn workstation design under digital twin, master PLC, robot, vision integrated control technology, complete micro switch visual detection and sorting.	teamwork	Case inspired; task driven The cooperative configuration of visual multi-party detection features can solve the problem of feature judgment of complex parts and lead to the spirit of teamwork
5	Project5 double robot collaboration Learn the collaborative integrated design of two robots; Master the cooperative integrated control technology of two robots; Realize motor assembly, transportation and detection into storage.	Innovation and effectiveness	Cooperative exploration, case inspiration The case of improved processing mode of dual robots in digital twin system is analyzed to train innovative thinking of optimized integrated control

3.3. Effectiveness and Experience

3.3.1. Teaching Effect

The main knowledge and skill points were tested, and the score of the test was 87 points. The students had a solid grasp of the new knowledge of system integration method, trajectory planning method, multi-module collaborative optimization measurement and so on. In order to better cultivate students' skills and specialties, students are taught according to their aptitude. Students enter the classroom to strengthen their skills according to the direction of tasks. The after-class test results show that the comprehensive evaluation of school evaluation and certification is more than 85 points, which has laid a solid foundation for the innovation and practice of the platform.

In the second class, students are encouraged to actively carry out the practice of consolidating and expanding the tasks of control system integration. The weekly extracurricular learning time of each student is increased from 2.2 hours to 4.9 hours, and the number of learning burnout is significantly decreased, and the conscientiousness and self-discipline are strengthened. The passing rate of 1+X certificate has increased significantly. Meanwhile, professional qualities such as teamwork, ingenuity, efficient service and labor innovation have been strengthened step by step, effectively promoting the formation of students' vocational values.

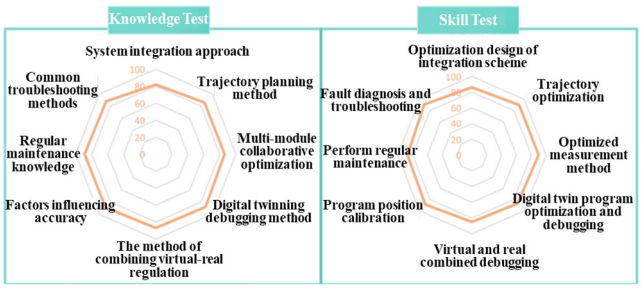


Figure 4. Effect of teaching implementation

3.3.2. Ideological and Political Teaching Reform Experience

This course adopts the ideological and political content framework based on "three levels, three dimensions, six elements, six evaluation", and carries out the construction mode of ideological and political focused design, so that the course ideological and political progressive cultivation of

students' ideological and political attributes, promote the realization of high quality ideological and political goals. The ideological and political focus of the course, the application of teaching methods, and the student assessment and evaluation form extracted from this model can be copied and promoted to other courses of this major and the curriculum system of similar institutions, so as to give full play to the demonstration and leading role and promote the construction of other courses. The course won the third prize in 2021 National Teaching Ability Competition.

4. Conclusion

In combination with the new requirements of regional industrial transformation and upgrading for talents, the course defines the ideological and political construction ideas of "culture leading, innovation first, ingenuity casting soul", systematically constructs the ideological and political content framework of the course from the three levels of individual, industry and country, and guides students to integrate the cultural heritage of design, the innovative concept of integration, and the exquisite skills of installation in the process of project implementation. Cultivate students' humanistic background, industrial values and craftsman spirit step by step. The teaching process of "3721" under the guidance of ideological and political integration into "focused" design is explored. Before class, students learn typical enterprise cases through "3 steps" to focus on problems. During class, they hone the core skills of robot integration control repeatedly through "7 steps and 5 exercises". After class, they consolidate key points through "2 steps" to expand the practice of enterprise real technological transformation projects on the innovation platform, and transform the knowledge and technology learned in class into practical application in production. The "1 incubation" link incubates students' patents, innovative projects and other achievements, and gradually achieves ideological and political goals in project practice. Implement the concept of educating students with three aspects, design a multiple and collaborative evaluation system, and integrate the evaluation content with the three-dimensional goal of ideological and political elements, so as to comprehensively promote students to become talented; The formative evaluation runs through the whole course teaching process, is relative to the teaching link and stage growth, and pays attention to the value-added evaluation; Platform tutors attach importance to professional norms, teachers attach importance to goals, students attach importance to process participation, and all staff participate in collaborative evaluation, prompting students to attach importance to curriculum ideology and politics.

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