

# Exploration of Ideology and Politics Education in *High-Level Language Programming Python* Under Case-Driven Teaching

Li Xin<sup>1\*</sup> Xuerong Shi<sup>2</sup> Decheng Zhang<sup>1</sup>

1. School of Artificial Intelligence (School of Software), Xinchuang Software Industry Base, Yancheng Teachers University, No.2 Hope Avenue Road, Yancheng 224002, China
2. School of Mathematics and Statistics, Yancheng Teachers University, No.2 Hope Avenue Road, Yancheng 224002, China

\* E-mail of the corresponding author: [yctcxl@yeah.net](mailto:yctcxl@yeah.net)

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## Abstract

Under the background of collaborative education of ideological and political courses, it is urgent to realize the organic integration of value leadership, knowledge transfer and ability cultivation in teaching of the High-Level Language Programming Python course. For this purpose, a task driven teaching method based on ideological and political cases is proposed. Firstly, ideological and political objectives are established, and 12 typical cases are designed about the objectives. Secondly, to deeply integrate knowledge transmission, ability cultivation, and value leadership, the teaching exploration is carried out from some aspects, such as the teaching content, the teaching implementation, and the course assessment system. This teaching method not only can stimulate students' desire for knowledge and exploration, increase students' insight, but also can cultivate students' self-learning ability, innovation ability and continuous learning ability. The method has remarkable effect in teaching practice.

**Keywords:** Case-driven teaching, Ideology and politics education, Python

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## 1. Introduction

"Talent cultivation in higher education is a process of unification of nurturing and talent. To build a high-caliber talent cultivation system, it is essential to integrate the ideological and political education system throughout and to focus on the development of curriculum-based ideological and political education ". An important instruction of the General Secretary pointed out, we should insist on making the establishment of morality and nurture people as the central link, running ideological and political work through the whole process of education and teaching, and realizing the whole process of nurturing people and all-round nurturing (Zhang 2016). Above two viewpoints requires that ideological and political work be integrated into the whole process of education and teaching of college courses to realize the fundamental task of establishing morality and educating people.

In order to implement the integration of ideological and political work and curriculum ideology into the whole process of education and teaching, educators in colleges and universities have made many explorations. Zhang Mingli and his colleagues have integrated ideological -political elements into the teaching of the Natural Resources course, enhancing the ideological -political awareness of both university teachers and students (Zhang & Wen 2023). Huang Tao and his team have designed and practiced curriculum-based ideological and political education in the Hydrology and Water Resources course, integrating ideological and political elements into the teaching process (Huang *et al.* 2023). Yang Dong and colleagues unearthed ideological-political elements and woven them into the cultivation of university students' innovation and entrepreneurship competencies (Yang & Zhang & Xu 2024). Sang Haitao and his team embedded ideological-political education while constructing a system for developing innovative practical abilities (Sang 2023). Compared with the integration of ideological-political education in practical training, its incorporation into classroom teaching is more difficult and receives greater emphasis.

The course High-Level Language Programming Python is a required departmental core course offered by our

university in the second semester of the first year, which starts in the 2nd semester of the freshman year. The course consists of 64 lessons, of which 32 are theoretical and 32 are practical. In such theory–practice integrated courses, ideological-political elements are usually woven into the theoretical sessions, whereas their inclusion in the practical sessions tends to be perfunctory and receives little serious attention.

In this paper, the case-driven teaching method is proposed and implemented in the whole process of theoretical and practical teaching. Throughout the teaching process, we mine ideological-and-political elements aligned with the syllabus, set explicit course-based ideological-and-political objectives, design corresponding cases, deliver the resulting instructional activities, build a dedicated case repository, and reform the course assessment system. This teaching approach broadens students' horizons and shapes their character, imperceptibly weaving ideological-and-political elements into every stage of instruction (Charlwood & Guenole 2022). Therefore, it fulfills the course's ideological-and-political objectives and fosters in students a sense of mission to explore the unknown and devote their talents to strengthening the nation through science and technology.

## 2. Some Pain Points in Traditional Teaching

The traditional teaching mode aims to introduce the knowledge points, explain the examples, consolidate the exercises, and then issue a test paper consisting of objective and subjective questions around the knowledge points for the final assessment, and finally combine the final grade, the usual attendance grade and homework grade for comprehensive evaluation. This teaching mode faces following three problems.

- (1) Focusing on knowledge and skill objectives, ignoring the cultivation of emotion, attitude and values. Traditional teaching models set knowledge and skill acquisition as the primary goal, rarely incorporating emotions, attitudes, and values into the teaching objectives. This approach fails to implement the guiding principle outlined in the Guidelines for Ideological and Political Education Construction in Higher Education Courses, which calls for integrating ideological and political education throughout the entire teaching and learning process.
- (2) The assessment remains at low cognitive levels. The renowned educational psychologist Benjamin Bloom categorized educational objectives into six ascending levels: remember, understand, apply, analyze, evaluate, and create. Traditional instruction usually tests only the three lower levels-remembering, understanding and applying—while seldom assessing the three higher- order thinking skills. Even when such assessment is attempted, conventional paper-and-pencil examinations are unable to measure the upper three levels effectively.
- (3) Insufficient personalized education. Our students come from all over the country, some of them have learned Python language programming in high school, while others know little about it. Standardized teaching for these students with different programming foundations can neither improve students' interest in learning nor meet their individual needs. In other words, it is difficult to meet the differentiated needs of students with standardized teaching.

## 3. Teaching Reform

Practical teaching constitutes a significant part of the university curriculum. Effectively integrating ideological and political education into these hands-on courses is a real-world challenge that every instructor must confront. In this paper, a case-driven instructional model is proposed, which threads ideological-and-political objectives through every phase of both theory and practice. Firstly, the model sets clear ideological-and-political objectives for the course. And then tailored civics cases around those objectives are designed. Finally, the implementation of teaching reform and teaching evaluation are accomplished. The core of the reform is to embed ideological-and-political elements into the curriculum and make them be an indispensable component of the course itself. The overall approach of the teaching reform is shown in **Figure 1**.

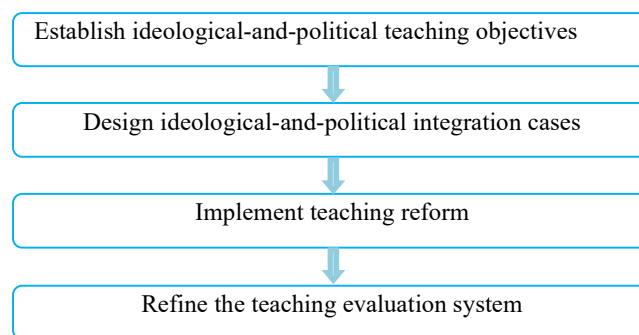


Figure 1. Overall approach of teaching reform

### 3.1 Establish Ideological-and-Political Teaching Objectives

The course *High-Level Language Programming Python* is designed for students majoring in teacher education at the School of Mathematics and Statistics. Guided by the *Guidelines for Curriculum-Based Ideological and Political Education in Higher Education*, the program's talent- training plan, professional objectives, and course goals, we formulated four curriculum-based ideological and political objectives and devised a matching case for each. In this way, ideological elements are seamlessly woven into the course content, enabling students to acquire new knowledge and skills while cultivating a correct worldview, outlook on life, and set of values. The corresponding objectives and cases are listed in **Table 1**.

(1) Cultivate patriotic sentiments and pass on the Chinese cultural lineage. Data input and output is an important module of Python program design, in which the classical contents of traditional Chinese culture are used as cases to talk about the methods and techniques of data input, output and processing. Students select their favorite classical Chinese poems and complete the "Appreciation of Classical Poetry" case study. Through this project, they are guided to appreciate the excellence of traditional Chinese culture, strengthen their cultural identity, and subtly cultivate a deep sense of patriotism.

Lists are the most frequently used sequence type in Python. Through the case study "Idioms Solitaire", students master the definition and application of lists. Idioms are the essence of the Chinese language; the case employs value-laden idioms to convey positive energy and mold students' sound character.

Creating dictionaries, applying them, and performing file I/O are all core topics in Python programming. In the case "Word-Frequency Analysis of *Dream of the Red Chamber*", students learn to read data from files, write results back to files, and use dictionaries to implement mappings. At the same time, students are guided to appreciate classic literary works, enhancing their humanistic qualities. Through the three cases rooted in Chinese culture, students not only pick up programming skills but also internalize the national spirit, build cultural confidence, and willingly become guardians and inheritors of Chinese civilization.

(2) Building a sense of rules and cultivating professionalism. In the study of multi-branching and exception handling, through the case of "Buying full or half tickets", students are guided to understand the dialectical unity between the rigid constraints of rule consciousness and the flexible adjustment of humanistic care. In the case of "Rock-Paper-Scissors", students can learn to use infinite loop, break statement, function definition and invocation, etc. At the same time, students can experience the necessity of the existence of rules, and master the general method of winning in the game, that is, first of all, we must understand and abide by the rules of the game, and then through independent thinking and continuous practice in order to getting victory. In the case of "Generate Captcha", students can understand the application scenarios of random library, string library, secrets library and for loop. By comparing different solution methods, students can realize the importance of code optimization and efficiency improvement, and cultivate the craftsmanship of students to strive for excellence. Through the above 3 cases, the importance of code quality is emphasized, and programming specifications are combined with professional ethics to cultivate students' engineering ethics and professionalism.

(3) Instill information ethics and foster respect for the rule of law. Through the "Add Group Verification" case, students can master branching structures, realize the necessity of setting passwords, and take on the social responsibility of maintaining information security. Through the case "Extracting Original Text from the Analects", students can learn file I/O and string manipulation, as well as understanding the importance of copyright protection and academic integrity. When learning network crawler technology, through the case of

“Crawl Campus News”, students can understand the Data Security Law, Network Security Law and other relevant laws and regulations, and talk about the legal consequences of illegally crawling data. Through these three cases, students are guided to enhance privacy protection and establish correct legal concepts, thus building a people-oriented civic literacy.

Table 1. Objectives and Cases of Civic and Political

Civics Objectives	Case Content	Civics Elements	Instructional Content
Cultivate patriotic sentiments and pass on the Chinese culture.	Appreciation of Classical Poetry	Family and Country Sense Cultural Confidence	Data input and output
	Idioms Solitaire	Competitive Awareness Teamwork	List definition and application
	Word-Frequency Analysis of <i>Dream of the Red Chamber</i>	Patriotic Sense Humanistic Literacy	Dictionary creation and application
Build a sense of rules and cultivate professionalism	Buying full or half tickets	Rule Awareness Humanistic Concern	Multiple branches and try-except
	Rock-Paper-Scissors	Fairness and Justice Independent Thinking	Function definition, invocation and infinite loops
	Generate Captcha	Craftsmanship Inclusive Philosophy	Standard library and finite loop
Instill information ethics and foster respect for the rule of law	Add Group Verification	Professionalism Innovative Spirit	Single branch and double branch
	Extract the original Analects	Academic Integrity Copyright Protection	File I/O and string manipulation
	Crawl Campus News	Cybersecurity Data Security	Web scraping
Spark innovative thinking and cultivate self-learning ability	Draw Your Name	Self-learning Ability Innovative Thinking	Draw graphics
	Roll-Call Program	Scientific Thinking Craftsmanship	Tkinter library Threading library
	Assignment-Submission Statistics	Continuous Learning Group Collaboration	OS library and its applications

(4) Spark innovative thinking and cultivate self-learning ability. When learning the turtle library, students use the "Draw Your Name" project to write their own names on-screen, fostering a spirit of exploration. In the "Roll-Call Program" case study, students are allowed to study tinder library, threading library, message box, and other content on their own, and realize three types of roll call: sequential roll call, random roll call and designated roll call. In the realization of the case, through the continuous problem solving process, students get a sense of achievement, and at the same time appreciate the charm of programming, so as to cultivate students' ability to master the scientific method of thinking of engineering design and the craftsmanship of excellence (Ding 2015). In the "Assignment-Submission Statistics" project, students can learn independently how to import and use the OS library, thereby cultivating their ability for deep, self-directed learning. Through the above three cases, students are guided to carry out innovative practices relying on practical needs (Sang 2023), so that they can not only realize constant innovation and continuous learning, but also can improve their comprehensive quality and make a breakthrough in their future career development.

### 3.2 Implement Teaching Reform

*High-Level Language Programming Python* is a course combining theory and practice. The course is carried on via a blended teaching model that combines online and offline instruction. In order to effectively accomplish the teaching objectives and rationally plan the teaching tasks, the course teaching implementation process is divided into five stages: pre-class online self-study, in-class theoretical teaching, in-class practical teaching, post-class expansion and case library construction. The implementation process of the teaching reform is shown in **Figure 2**.

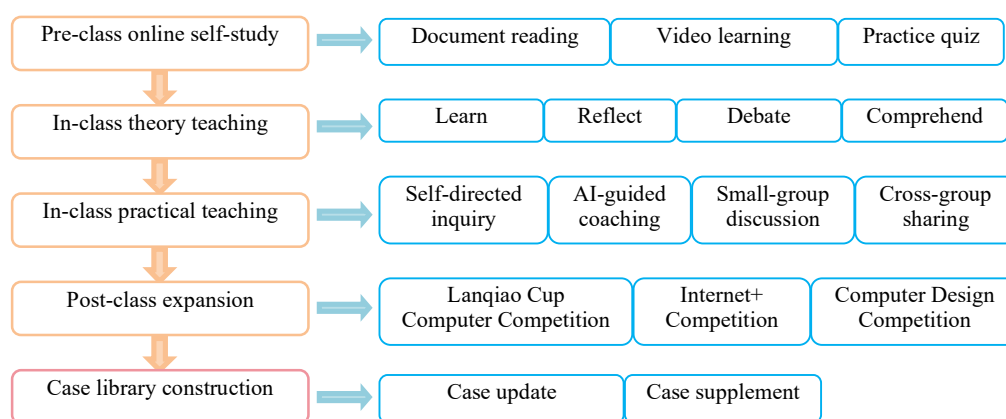


Figure 2. Implementation process of teaching reform

Stage 1: Pre-class online self-study. Before class, students achieve an initial grasp of the fundamentals by reading course documents, watching lecture videos, completing related exercises, noting down points of confusion, and participating in small-group discussions.

Stage 2: In-class theory teaching. In the theoretical teaching, the “learn-think-debate-reflect” pedagogy is adopted to inspire students’ thinking and stimulate their interest. The teacher first introduces an ethics-integrated case, describes it, analyzes it step-by-step, and guides students to draw the case flow-chart. Students then use the flow-chart to write the corresponding code, optimize it via peer review. After that, students can discuss the limitations and problems of the case implementation in groups, think about the solutions to these problems, and complete the case progression. Through theoretical teaching, students complete the understanding and application of the basic knowledge points from the case proposal, analysis, realization and progression, step by step.

Stage 3: In-class practical teaching. In the practical teaching section, the teaching method of independent inquiry, intelligent guidance, group discussion, sharing among groups is adopted. Students are divided into groups, and each group is assigned different case study contents. Students complete the code framework through independent exploration, then write and debug the case development code with the assistance of AI, and finally optimize and improve the code through group discussion. After the completion of the case development, each group submits the code and selects a representative content to share it in the class, the teacher and other group members score it, and finally selects the excellent case for online release. Through practical teaching, students further deepen their knowledge application ability, case evaluation ability and innovation ability (Zhang *et al.* 2023).

Stage 4: Post-class expansion. Encourage students to create new projects—such as an attendance system, a simple to-do list manager, or a shopping-cart system—to cultivate the mindset of serving society with Python technology. Encourage students to take part in competitions such as the “Lánqiáo Cup” Programming Contest and the “Internet+” College Students Innovation and Entrepreneurship Competition.

Stage 5: Case library construction. Let students compile their own cases, select the outstanding ones, add them to the case library, and publish them online in the SPOC course, thereby expanding and updating the course case library. Select a set of representative cases for in-class sharing to boost the authors’ sense of reward and achievement, broaden classmates’ horizons, spark new ideas, and foster students’ innovation capacity.

Through the five stages of pre-class online self-study, in-class theoretical instruction, in-class hands-on practice, after-class extension, and case-base development, students’ ability can be improved from memorizing and understanding knowledge to analyzing, applying, and ultimately creating with it.

### 3.3 Refine the Teaching Evaluation System

In the new teaching model with AI participation, the evaluation system consists of two parts: outcome evaluation and process evaluation. Outcome evaluation includes three parts: usual practice questions, unit quizzes and final quiz, all of which are conducted online in the form of objective questions. Process evaluation is a comprehensive analysis of students’ daily learning behavior and homework performance, which can provide a comprehensive and objective evaluation. The process evaluation involves students’ usual video learning, participation in discussions, case progression, case expansion, as well as the final homework, students’ value-added evaluation,

students' mutual evaluation and teachers' comprehensive evaluation. Firstly, students' learning attitude and knowledge mastery are examined through online learning hours, participation in discussions, and online quizzes. secondly, students' critical thinking ability and group cooperation ability are examined through offline students' completion of case progression and case expansion. And finally, students' innovation ability is examined through students' sharing of extracurricular cases. The teaching evaluation system is shown in **Table 2**.

Table 2. Teaching Evaluation System

	Evaluation Method	Evaluation Content	Sub-weights	Total Evaluation Weights
Usually	Outcome evaluation	Practice Questions	25%	40%
		Unit Quizzes	25%	
	Process Evaluation	Pre-Class Video Study	10%	
		In-Class Participation in Discussions	15%	
		In-Class Case Progression	15%	
		Post-Class Case Expansion	10%	
Final	Outcome evaluation	Final Quiz	20%	60%
	Process Evaluation	Final Major Assignment	50%	
		Value-Added Student Evaluations	10%	
		Student Mutual Evaluations	10%	
		Comprehensive Teacher Evaluations	10%	

#### 4. Teaching effect

In the teaching process of the course High-Level Language Programming Python, a teaching design of structured knowledge system, integration of ideological and political education and case-based instruction is adopted, which has achieved remarkable effect.

- (1) By emphasizing students' emotional engagement, learning efficiency has been significantly improved. Typical cases celebrating traditional Chinese culture have been selected to strengthen patriotism, while students' presenting their own outstanding programs lets them experience the joy of learning. It turns passive reception into active exploration and further boosts learning efficiency.
- (2) The assessment is designed to be high-order. The percentage of objective questions in the teaching evaluation that examines the knowledge and skills literacy is very small, and it mainly examines the students' understanding, analysis, evaluation and innovativeness of the knowledge and skills, which fully reflects the higher-order nature of the teaching evaluation. In the teaching process, students are encouraged to make up their own cases, share their cases, question, evaluate and discuss their cases, which stimulates students' critical thinking and cultivates their ability to think independently and innovative spirit.
- (3) It meets students' needs for personalized learning and boosts their interest. Self-study and tutoring before class are mainly for students with weak foundation to learn basic knowledge. Case progression and case expansion are mainly for students with better foundation and stronger acceptance ability to improve their ability to provide rich materials. Case sharing, case evaluation and after-class expansion are for students who are particularly interested in in-depth learning and the establishment of the content. Through layered teaching, the personalized learning needs of students with different levels of knowledge and ability are well met.

#### 5. Conclusion

Based on clearly established ideological and political objectives, ideological-education cases are carefully designed and integrated throughout the entire process of theoretical and practical teaching, and remarkable educational outcomes achieved. Three principles are followed in the design of ideological-and-political cases, such as effectively combining explicit knowledge and skill transfer with implicit humanistic elements (Hou & Wang & Jia 2022), appropriately interfacing with technical scenarios and social hotspots, and embodying dialectical thinking, humanistic care and scientific spirit in the algorithmic logic. By embedding ideological and political education into case-based teaching, the model achieves a three-dimensional integration of knowledge transmission, competence development, and value guidance (Huan & Wang 2022). In teaching practice, the differences and individuality of students are fully respected, and diverse learning styles and process evaluation



methods are created to impart knowledge, enlighten wisdom and illuminate life. In this paper, AI tools are also introduced into teaching practice to explore the innovative path of deep integration of programming courses with the elements of ideology and politics in the era of AI, so as to cultivate new-age college students who are technologically savvy, temperate and responsible.

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