

# *Instructional Design Integrated with Curriculum Politics for Engineering Drawing Based on a Network Teaching Platform*

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**Abstract:** Fostering virtue through education is an important goal of higher education. This objective requires college educators to not only impart professional knowledge but also participate in curriculum politics in their teaching roles, so as to form a synergistic educational effect of professional knowledge and ideological and political education. In recent years, affected by the COVID-19 epidemic, many colleges and universities have adopted a mixed teaching method combining online and offline and opened online learning courses. However, the current online learning platforms primarily offer teaching materials for professional courses, and resources for curriculum politics education still need to be improved. Addressing how to fully utilize the online teaching platform as a second classroom, concurrently advancing curriculum politics education within the online setting, infusing ideological and political education into each section of online learning, promoting a comprehensive and holistic approach to ideological and political education throughout the entire learning process, and achieving the fundamental goal of cultivating virtues and nurturing individuals holds significant practical significance. Taking "Engineering Drawing" as an example, this paper discusses the teaching design method of integrating network teaching resources into the course politics class. It establishes a comprehensive knowledge system for curriculum politics in the "Engineering Drawing" course, constructs curriculum politics online teaching resources, establishes mechanisms for online and offline curriculum politics communication and interaction, and enhances the quality of character education in curriculum politics.

## 1. Introduction

In contemporary higher education, fostering virtue through education has become an important educational goal[1,2]. This crucial objective not only involves imparting traditional professional knowledge to students but also integrating ideological and political education into daily teaching practices. The aim is to assist students in cultivating strong moral qualities and a sense of social

responsibility. In response to the impact of the COVID-19 pandemic, many universities have embraced a hybrid teaching model, incorporating both online and offline methods and introducing courses for online learning[3]. Online teaching solves the limitations of traditional classroom teaching and provides students with richer and more dynamic learning resources [4]. At the same time, how to integrate network teaching resources has become an important issue in the ideological and political construction of college curricula.

Currently, many online teaching platforms predominantly focus on providing learning resources for professional courses while relatively neglecting the importance of curriculum politics. In fact, there is an opportunity for us to fully leverage these online teaching platforms as a second classroom, seamlessly integrating ideological and political education with professional courses to achieve a comprehensive and integrated approach to ideological and political education throughout the entire learning process. This kind of integration is not only conducive to improving the effectiveness of ideological and political education, but also conducive to realizing the goal of cultivating people by virtue[4,5].

The cultivation of ideological and moral values in education necessitates a strategic focus on foundational courses[6]. "Engineering Drawing," designed for first-year students in engineering disciplines, serves as a fundamental course characterized by its extensive content and broad coverage, rendering it a pivotal initiator for ideological and moral education[7]. The primary aim of "Engineering Drawing" is to foster students' spatial thinking and drawing abilities. With the continuous advancement of online teaching in universities and the ongoing development of curriculum politics, the integration of ideological elements into the online instruction of "Engineering Drawing" has become a significant concern. Hence, this paper aims to explore the effective amalgamation of online teaching with ideological and moral education in the context of the "Engineering Drawing" course, ultimately enhancing the efficacy of classroom instruction.

This paper uses "Engineering Drawing" as a case study to explore the integration of curriculum politics into online teaching, accompanied by the design of corresponding classroom teaching methods. Building on an in-depth examination of curriculum politics within the "Engineering Drawing" curriculum, a systematic development of curriculum politics is undertaken to align with the professional knowledge framework. By creating online teaching resources and establishing both online and offline mechanisms for ideological and political discussions, the study aims to enhance the quality of ideological and political education. The teaching design will build a diversified network of teaching resources, and establish a combination of online and offline communication mechanism to promote the communication and interaction between teachers and students. The implementation of these measures is anticipated to improve the effectiveness and quality of ideological and political education, ultimately achieving the educational goal of moral education.

This study aims to provide university educators with an instructional design approach that integrates online teaching resources into ideological and political education classrooms. For students, this offers an opportunity to access a more diverse and vivid array of ideological and political education resources on online platforms, thereby enhancing their understanding of the ethical and social responsibilities underlying their academic knowledge. Simultaneously, through a mixed online and offline interaction mechanism, students are actively involved in promoting self-education and mutual learning. This methodology not only contributes to the effectiveness of ideological and political education but also aligns with the educational objective of fostering well-rounded individuals.

## **2. The Main Knowledge Points of the "Engineering Drawing" Course**

"Engineering Drawing" is a crucial foundational course in engineering disciplines, designed to

equip students with the skills to read and create engineering drawings, laying the groundwork for subsequent studies in mechanical engineering courses. The curriculum mainly covers the projection principle of geometric forms, the expression of engineering drawings, the drawing of parts (including standard and non-standard parts), and the production of assembly drawings. The principles of mechanical drawing, national standards, and expression methods of engineering drawing are introduced in detail. Through this course, students develop the ability to produce engineering drawings, acquiring a broad foundation of professional knowledge to prepare them for future studies in mechanical engineering courses such as mechanical design and structural design. The overall chapter structure and teaching objectives of engineering drawing are shown in Table 1.

Table 1: The teaching objectives of the engineering drawing course.

Chapters	Knowledge objectives	Ability objectives
Chapter 1 Basic knowledge of drawing	General provisions of drawing standards; The use of drawing tools and instruments; Drawing methods and steps	Ability to establish a sound outlook on life, values, and worldview, comprehend the professional norms associated with mechanical engineering, and possess humanistic and social science literacy along with a sense of social responsibility
Chapter 2 Projection of points, lines, planes, and solids	Basic knowledge of projection method; Projection of points, lines, and planes; Stereoscopic projection	Proficient in applying orthographic projection to represent spatial objects, rapidly interpreting engineering drawings, and accurately rendering views and sectional views
Chapter 3 Composite solid	The formation and projection characteristics of three views of objects; The combination form of the assembly; Three views of the painting assembly; Read the view of the assembly; Dimensioning of assemblies	
Chapter 4 Basic representation of mechanical drawings	Views; Section view; Sectional view; Simplified representation; Locally enlarged image	
Chapter 5 Special representation of common machine parts and structural elements	Thread and threaded fasteners; Key and Pin Connections; Rolling bearing; Gear; spring	Familiar with technical standards and regulations, knowledge of intellectual property, industry policies, and safety management techniques. Understanding the influence of societal culture on engineering activities
Chapter 6 Parts drawing	The role and content of part drawing; Part drawing attempt selection; Dimensioning of parts drawing; Technical requirements for parts drawings; The process structure and the drawing of the transition line on the parts; Read part drawing	Capable of completing the design of mechanical components to meet specific requirements in the field of mechanical engineering and related areas

Table 1 (continued): The teaching objectives of the engineering drawing course.

Chapter 7 Assembly drawing	Expression method of assembly drawing; Dimensioning and technical requirements of assembly drawing; Part serial number and detail column of assembly drawing; Assembly process structure brief introduction; Assembly drawing method; Read assembly drawings and draw parts from assembly drawings	Capable of completing the design of mechanical components to meet specific requirements in the field of mechanical engineering and related areas
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### 3. Curriculum Politics Teaching Design Methods

#### 3.1. Deep Exploration and Systematic Framework Construction of Curriculum Politics Elements

Combined with Thought on Socialism with Chinese Characteristics for a New Era, with the overall oriented goal of comprehensively building a modern socialist country and realizing the great rejuvenation of the Chinese nation, the curriculum's ideological and political elements of each chapter of the course of "Engineering Drawing" are fully extracted to establish a complete and comprehensive intellectual knowledge point of curriculum politics. Integrating extracted points of ideological and political education with the knowledge tree structure of course chapters, we construct an ideological and political knowledge system that corresponds to the course's knowledge framework. It provides a systematic and detailed knowledge system of ideological and political education for engineering majors. For example, combined with architect Liang Sicheng's hand-drawn drawing of Foguang Temple in Wutai Mountain in Section View, as shown in Figure 1, students are guided to develop rigorous, meticulous, serious, and standardized work quality.



Figure 1: A hand-drawn drawing of Foguang Temple in Wutai Mountain by master architect Liang Sicheng.

In each chapter, a thorough exploration of the ideological and political elements underlying the knowledge points is conducted, leading to the extraction of key elements for curriculum politics. This process involves constructing a curriculum politics knowledge system that aligns with the

professional knowledge framework. Additionally, a comprehensive teaching outline is designed, integrating the ideological and political system seamlessly into classroom instruction. For instance, when elucidating drafting standards and specifications, the incorporation of national and international drafting standards is proposed. This inclusion serves to underscore the importance of professional ethics and regulatory awareness. Similarly, when discussing part drawings and assembly drawings, aspects such as craftsmanship and innovation spirit can be introduced, guiding students to foster correct professional values. This approach ensures the development of the curriculum, not only to impart technical expertise but also to guide students to establish correct professional values.

### 3.2. Establishment of Diverse Online Teaching Resources for Curriculum Politics

By making use of abundant pictures and video resources on the Internet and combining with the established political framework of the "Engineering Drawing" course, college teachers need to make courseware and teaching video of corresponding ideological and political education points. This initiative aims to construct a diverse array of learning resources for ideological and political education within the course. Furthermore, by integrating specific application cases related to the course knowledge points in production and daily life, establish ideological and political materials that demonstrate the practical application of these knowledge points. This expansion serves to enrich the learning resources for ideological and political education within the course, fostering a close relationship between course-based ideological and political education and its real-world applications.

Teachers can also look for stories, pictures and videos corresponding to the political knowledge points of the course, and combine these materials to make educational slides and videos of ideological and political education. Expanding ideological and political knowledge points in the latest application of ideological and political cases build rich ideological and political teaching resources. In online teaching, college teachers use various forms of teaching resources such as text, pictures, videos and animations to combine ideological and political elements with course content to produce attractive and influential educational slides and videos. For example, in the Limit and Fit chapter, the machining process of precision gear and the installation process of precision transmission are introduced (as shown in Figure 2) to educate students to have the spirit of excellence.

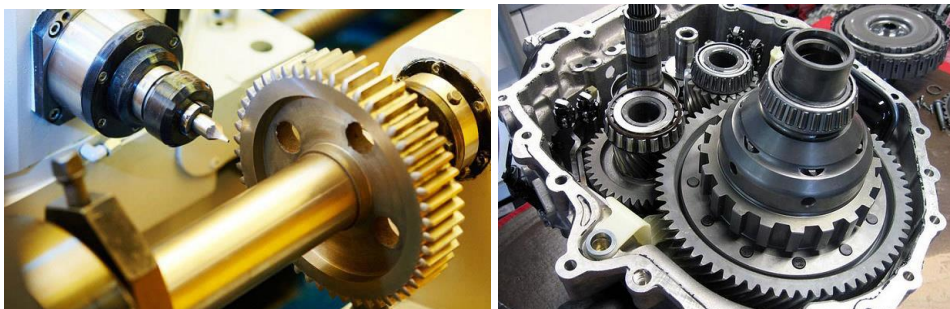


Figure 2: Precision gear machining process and precision transmission installation process.

### 3.3. Hybrid Online and Offline Communication Interaction Mechanism

Teachers need to design after-school learning and interaction methods based on the network teaching platform, and optimize the evaluation system of peacetime performance. In daily learning, professors can publish discussion topics on the online teaching platform and guide students to actively participate in the discussion. They can also use the homework submission function of the

online platform to collect students' works for display and evaluation. Students are required to collect relevant ideological and political materials and discuss them in offline class groups. These approaches ensure a comprehensive integration of ideological and political education through both offline and online channels, enhancing student engagement and assessment effectiveness.

In offline ideological and political education classes, a group-based approach is employed to conduct the collection of ideological and political materials and showcase works related to a specific ideological and political element. Classroom group discussions and critiques are conducted, fostering engagement and active participation among students. This approach serves to enhance students' understanding of ideological and political education.

Outside the classroom, leveraging the SuperStar Learning Platform, specialized discussions on Search for the corresponding story introduction, pictures, and video materials of curriculum politics knowledge point are initiated. The progress and participation of students are monitored, integrating offline work showcases and online thematic discussions into the regular assessment mechanism. This amalgamation establishes a combined online and offline interactive mechanism, promoting proactive engagement and interest among students, thereby elevating the effectiveness and quality of ideological and political education.

#### 4. Conclusions

The political design method of the "Engineering Drawing" course integrated with network teaching is put forward, which has a positive role and significance to improve the effect and quality of ideological and political education. This design not only fosters students' professional knowledge and skills but also nurtures their moral character and sense of social responsibility. Consequently, the research findings presented in this paper hold significant value for broader dissemination and practical application.

(1) Firstly, integrating online teaching resources into the "Engineering Drawing" course facilitates the organic integration of professional knowledge and curriculum politics. By exploring ideological and political elements within the curriculum, it is possible to construct a corresponding curriculum politics knowledge system that aligns with the professional knowledge framework. Designing classroom activities that seamlessly incorporate the complete curriculum politics system enhances the effectiveness and quality of curriculum politics, achieving the educational goal of fostering moral integrity and personal development.

(2) Secondly, diversified online teaching resources enrich both the content and forms of curriculum politics. By searching for real-life stories, images, and video materials corresponding to ideological and political knowledge points, one can create engaging and inspirational educational materials and videos. Simultaneously, expanding the application of curriculum politics knowledge through the latest case studies guides students in cultivating proper professional values and an innovative spirit. Sharing these resources through online teaching platforms supports students in autonomous learning and participation in online discussions.

(3) Finally, a combined online and offline interactive mechanism fosters communication and interaction among teachers and students, as well as among students themselves. Activities such as offline classroom group discussions and online showcases contribute to enhancing communication and interaction. Moreover, utilizing post-lecture learning and interactive features on the online teaching platform optimizes the regular assessment and evaluation system, sparking students' interest and enthusiasm for learning. This design better leverages the students' active role, facilitating self-education and mutual learning.

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