

The Excavation and Practice of Ideological and Political Elements in “Civil Engineering Drawing and CAD”

Shengnan Peng^{*1}, Yeming Wang¹, Fan Xu²

¹School of Civil Engineering, Nantong Institute of Technology, Nantong 226002, Jiangsu, China

²Nanjing Foreign Languages School, British Columbia Academy 210006, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: Ideological and political education in courses has become an important part of curriculum teaching and research. This paper continuously excavates the ideological and political elements contained in the course of “Civil Engineering Drawing and CAD” and integrates them into the course teaching process. Practice has shown that the excavation and application of ideological and political elements in courses can not only enhance the teaching effectiveness of this course but also greatly benefit students’ subsequent course learning and future education for personal growth and development.

Keywords: Civil Engineering Drawing; CAD; Ideological and political education in courses; Excavation; Practice

Online publication: July 31, 2025

1. Introduction

“Civil Engineering Drawing” and “Civil Engineering CAD,” as professional foundational courses, play a prominent and crucial role in the cultivation of talents in civil engineering majors, especially in application-oriented universities. This is due to two main reasons: first, they are related to the subsequent learning of many courses related to engineering drawing and CAD; second, they are related to the cultivation of abilities necessary for students’ preliminary employment competitiveness and subsequent career development. Currently, universities have not unified the way these two courses are offered. Some universities offer them independently, while others integrate CAD content into the “Civil Engineering Drawing” course as a single course ^[1], referred to as the “integration” mode. For many years, the author has adopted the “integration” mode in application-oriented universities and fully integrated CAD into the teaching process through an “assignment-driven” approach, achieving the goal of simultaneously enhancing the teaching quality of “Civil Engineering Drawing” and students’ CAD application abilities ^[2]. Among them, the ideological and political elements contained in the course and their organic integration into the course teaching process have played a vital role in enhancing the

course's teaching effectiveness.

2. Excavation of ideological and political elements in “Civil Engineering Drawing and CAD”

This course involves numerous ideological and political elements. Domestic university colleagues have formed a batch of reference-worthy ideological and political achievements, such as emphasizing the study and compliance with national standards to cultivate students' meticulous and rigorous work attitudes and sense of responsibility. Based on this, over the years, the ideological and political elements that the author has continuously excavated and practiced in the teaching of this course mainly include the exemplary role of teachers through their actions, the “bottom line” education of honesty as the foundation, the rigorous style of enforcing standards and specifications, and the “trinity teamwork” of facing and overcoming difficulties. These have formed the unique ideological and political education effects of this course.

3. The ideological and political education practice in “Civil Engineering Drawing and CAD”

3.1. Teachers' exemplary actions

It is well-known that the implementers of ideological and political education in courses are teachers, and the target audience is students^[3]. The ideological and political quality of the implementers directly affects the actual effectiveness of the education. As the saying goes, “Teaching and nurturing people involves more in setting examples than in merely giving speeches.” “When one's conduct is upright, one need not give orders; they will be followed. Conversely, if one's conduct is not upright, no orders will be followed, even if given.” Teachers should abide by what they require of students and refrain from what they prohibit students from doing. Setting an example and leading by example are the guarantees for the implementation of ideological and political education. For instance, teachers should arrive at class early rather than be late, as they require students not to be late. For many years, the author has always announced the same thing at the beginning of each course: the teacher guarantees not to be late for class, and if late, will publicly make a self-criticism to the students.

Additionally, teachers should make students feel that they have prepared the lesson carefully and proficiently. For example, in teaching this course, namely the “assignment-driven” teaching mode that integrates CAD into civil engineering drawing, there are high requirements for the instructor. Teachers need to be very familiar with the teaching content of the two courses and are required to “speak and demonstrate simultaneously” throughout the course, seamlessly switching between explanations and demonstrations, as well as switching between different environments and software platforms with ease to achieve better results^[4]. In this teaching process, students will perceive the teacher's carefulness and proficiency, which will influence their after-class review and homework completion, and further influence their attitudes and effectiveness towards learning this course.

3.2. Strengthening honesty education

It is undeniable that plagiarism and copying of assignments are common issues among college students, which are also difficult for teachers to handle. Furthermore, the practice of this teaching mode requires completing assignments on the CAD software platform, making it seemingly more difficult to prevent students from

copying electronic assignments ^[5-8]. The author believes that educating students to complete each assignment independently and fostering honesty and trustworthiness are the most important aspects of ideological and political education that can be implemented in this course, and also the best ideological and political education for setting the “bottom line” for students’ character development ^[9]. Therefore, to prevent students from copying others’ assignments or sharing their assignments, the main approaches taken in this paper include: first, strengthening education; second, having students sign a “Commitment Not to Copy Assignments” at the beginning of the course; and third, carefully and thoroughly grading students’ assignments and announcing and promptly dealing with any copying found.

In summary, by strengthening honesty education, signing commitment letters, checking for assignment copying, and publicly criticizing and warning about copied assignments, it is effective in controlling assignment copying among students while also promoting the development of good study and class atmosphere ^[10].

3.3. Reinforcing standards and norms

As everyone knows, engineering drawings are the language of engineers, and just like natural languages have grammar, engineering drawings are full of standards and norms. For example, lines have different types (solid, dashed, single-dot, double-dot, broken, and wavy) and different width requirements (thick, medium-thick, medium, and thin). If teachers do not strictly require this, students’ drawings will not distinguish between thickness and thinness, solid and dashed lines. Another example is dimension marking; in engineering, “construction according to drawings” is a very rigorous and serious engineering issue. Too many dimensions can cause contradictions, too few dimensions can make construction impossible, and incorrect dimensions can even lead to safety accidents ^[11]. If students violate national drawing standards and norms everywhere when learning drafting, and have no “reverence” for engineering drawings, they will never develop the professional ethics and rigorous work style required of engineers in the future. Therefore, in course teaching, the author has always emphasized education on engineering drawing standards and norms, requiring students to carefully treat each line, character, and dimension when drawing and to correct any violations of standards and norms. By repeatedly correcting errors until they are right, students can gradually develop the habit of consciously adhering to relevant national drawing standards and norms.

3.4. Overcoming difficulties as a team

Engineering drawing courses not only impart knowledge such as engineering drawing standards and norms, projection theory, and professional drawing but also undertake the task of enhancing students’ spatial thinking abilities, which are essential for engineering students and play a crucial role in their future career development. Spatial thinking ability, like memory ability, varies innately among individuals. Generally, students’ innate spatial thinking abilities are distributed with a small proportion at both ends and a larger proportion in the middle. Specifically, in a class, there are always about 10% of students with strong innate abilities who find learning drafting courses very easy, and simultaneously, about 10% of students with innate deficiencies are referred to as “students who struggle” with engineering drawing learning ^[12].

Their poor foundational spatial thinking abilities were actually evident during their high school study of solid geometry. In engineering drawing courses, it is not only important to enhance the spatial thinking abilities of students with average to strong innate abilities to further develop their skills but more importantly, to help “students who struggle” with innate deficiencies achieve the necessary spatial thinking and discrimination abilities for engineering students to meet the requirements of their future careers ^[13]. Over the years, the author’s

main approach has been: first, quickly identify which students belong to the “struggling” group, have heart-to-heart talks with them, let them know that spatial thinking ability can be developed and improved later in life, and help them build confidence to overcome difficulties; second, make it clear to struggling students that they are the ones who must overcome difficulties, and they must face difficulties bravely and cultivate their willpower and perseverance, that is, they must have determination; third, leverage teamwork to collectively overcome difficulties.

4. Conclusion

Through the continuous exploration of the ideological and political elements contained in the “Civil Engineering Drawing and CAD” course, especially its organic integration with the course teaching process, a comprehensive improvement in teaching effectiveness has been achieved^[14]. Simultaneously, students’ independent and cooperative abilities, as well as their overall qualities, have been enhanced, which will undoubtedly aid them in their subsequent course studies and future personal and professional development^[15]. Moving forward, the author intends to continue excavating the ideological and political elements embedded in this course. For instance, when teaching CAD drawing and editing functions, the author plans to integrate the drawing of party flags and national flags with CAD-related techniques, enabling students to master CAD skills while subtly imbuing them with patriotic education, fostering an awareness of the party flag and national flag in their hearts.

Funding

China Campus Health Action Education and Teaching Research Achievement Project, “Research on the Implementation Path of Ideological and Political Education in Civil Engineering Professional Courses” (Project No.: EDU2156)

Disclosure statement

The authors declare no conflict of interest.

References

- [1] Ding Y, Yang Z, Huang S, et al., 2024, Civil Engineering Graphics (Fourth Edition). Higher Education Press, Beijing, 287–342.
- [2] Wang Y, 2018, Research and Practice of Integrating CAD into Civil Engineering Graphics Teaching under the “Assignment-driven” Mode. *Journal of Engineering Graphics*, 39(5): 1009–1013.
- [3] Suo J, Ma N, Chen D, 2024, Exploration and Practice of Integrating Ideological and Political Elements into Civil Engineering Surveying Teaching. *Geomatics and Spatial Information Technology*, 2024(003): 047.
- [4] Zhang C, Zhao Y, Jiang J, 2023, Practice and Exploration of Ideological and Political Teaching in Professional Core Courses under the Background of New Engineering. *Education and Teaching Forum*, 2023(10): 101–104.
- [5] Xia X, 2024, Mining and Practice of Ideological and Political Elements in Architectural CAD Course under the Background of New Engineering. *Proceedings of the 2024 Education and Teaching Innovation and Development Exchange Conference*, Beijing.

- [6] Jiang J, Zhang H, Mi L, 2020, Discussion and Practice of Ideological and Political Courses in Civil Engineering. Theoretical Observation, 2020(6): 32–35.
- [7] Han B, Li A, Bei G, et al., 2024, Exploration and Practice of Ideological and Political Element Mining and Integration in Engineering Training Courses. University Education, 2024(6): 65–68.
- [8] Li H, Liu Y, Zhao J, 2024, Research and Practice of Integrating Ideological and Political Elements into Soil Mechanics Teaching. University (Teaching and Education), 2024(11): 122–125.
- [9] Chen Y, Zhou Q, Qi S, 2024, Mining and Practice of Ideological and Political Elements in Higher Vocational Construction Engineering Technology Specialty. Journal of Hubei Open Vocational College, 37(18): 108–110.
- [10] Yu X, Jia C, Li W, 2021, Exploration and Practice of Ideological and Political Elements in Soil Mechanics Course. Curriculum Education Research, 2021(9): 18–21.
- [11] Fu S, Li S, Shen H, et al., 2024, Exploration of Teaching Reform of Integrating Ideological and Political Elements into Materials Mechanics Course. Journal of Zhongyuan Institute of Technology, 35(06): 31–34 + 40.
- [12] Qu M, Hao L, Li J, 2024, Preliminary Exploration of Engineering Management Practice from the Perspective of Course Ideology and Politics. Journal of Hubei Open Vocational College, 37(24): 118–120.
- [13] Bai H, Jia H, 2025, Exploration of Teaching Reform in the Course of “Principles and Applications of Machine Vision” Based on the “Four in One” Mode. Vocational and Technical, 24(1): 96–101.
- [14] Chen M, Gao J, Du W, 2024, Reform and Practice of Ideological and Political Education in Engineering Mechanics Courses for Civil Engineering Majors. Research on Course Ideological and Political Education, 7(2): 164–175.
- [15] Gao L, Li E, Zhang Q, 2023, Construction and Teaching Discussion of the Ideological and Political Element Database of the Practical Course of “Civil Engineering Surveying”. University: Ideological and Political Teaching and Research, 2023(7): 77–80.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.