Advances in Vocational and Technical Education (2024)
Clausius Scientific Press, Canada

DOI: 10.23977/avte.2024.060218
ISSN 2523-5834 Vol. 6 Num. 2

Research on the Integration of Ideological and Political Elements into Mechanical Drawing Courses

Yuanyuan Cui[1,a,*], Wenbo Zhu[1,b]

[1]*School of Mechanical Engineering, University of Shanghai for Science and Technology, Shanghai, 200093, China*
[a]*yyhdlg@163.com*, [b]*teacherzwb@163.com*
[*]*Corresponding author*

Keywords: Mechanical Drawing, Ideology and Political Elements, Teaching Method

Abstract: This paper explores the importance and implementation strategies of integrating ideological and political education into the mechanical drawing curriculum. Initially, it introduces the pivotal role of the mechanical drawing course in engineering majors, emphasizing its guidance in shaping students' correct worldview, outlook on life, and values. Subsequently, it elucidates the ideological and political elements within the mechanical drawing curriculum, encompassing historical significance and development, standardization, and normalization, as well as teamwork and communication. Furthermore, it proposes implementation strategies for incorporating ideological and political education, including teaching content design, heuristic teaching methods, themed discussions and activities, utilization of modern technology, and teacher-student interaction. Finally, it summarizes the research findings and underscores the significance of ongoing efforts to enhance ideological and political education in the mechanical drawing curriculum, aiming to cultivate socialist builders and successors with comprehensive development in morality, intelligence, physical fitness, and aesthetic appreciation. Through continual improvement of teaching content and methods, we aspire to make greater contributions to students' holistic development.

1. Introduction

The mechanical drawing course holds significant importance in engineering majors, not only for cultivating students' professional skills but, more importantly, for guiding them to establish a correct worldview, outlook on life, and values through the course's ideological and political elements [1]. The purpose of this paper is to explore the content of ideological and political elements in the mechanical drawing course, its implementation strategy, and the influence of this course on students' ideological and political quality.

2. Ideological and Political Elements in the Mechanical Drawing Course

The mechanical drawing course stands as one of the foundational courses in engineering majors. The ultimate goal of the course is to be able to read and draw the part drawing and assembly drawing, which covers many aspects such as graphics, materials science and manufacturing technology.

Through careful design of teaching content and selection of teaching methods, the course can effectively integrate ideological and political elements [2]. For instance, by introducing historical significance and development, students can gain insights into the societal impact of technological advancements, thereby fostering a correct understanding of history and development. Additionally, emphasizing teamwork and communication during teaching practices cultivates students' spirit of teamwork and collaboration, thus nurturing their socialist core values [3].

2.1 Historical Significance and Development

The origins of mechanical drawing can be traced back to ancient civilizations, including ancient Egypt, Ancient Greece, and Rome, where rudimentary mechanical devices and drawing techniques emerged. For instance, the ancient Egyptians utilized basic geometry and measurements in constructing the pyramids. However, a significant leap occurred during the Industrial Revolution, marking a pivotal stage in the evolution of mechanical drawing. As industrialization surged, mechanical drawing emerged as an indispensable tool in engineering design and manufacturing processes. During this era, mechanical drawing evolved from manual techniques to mechanization and eventually digitalization, witnessing the introduction of numerous drawing tools and methodologies.

Mechanical drawing has profoundly contributed to the advancement of engineering technology. Through precise graphical representation, engineers translate intricate design concepts into tangible products or engineering endeavours. Furthermore, the development of mechanical drawing has enhanced the accuracy and efficiency of engineering design, crucially supporting the progression of engineering technology. The standardization of mechanical drawing has fostered unified and standardized development within the engineering realm. Various standard parts drawings have facilitated the universality and modularization of engineering design, thereby enhancing product quality and production efficiency.

The advent of computer-aided design (CAD) technology has propelled mechanical drawing into the digital age. CAD software has revolutionized the practice of mechanical drawing, rendering it more convenient and efficient. Additionally, CAD provides designers with an array of advanced tools and functionalities, including three-dimensional modeling and virtual simulation.

In the digital era, traditional concepts and methodologies of mechanical drawing are undergoing transformation. Adapting to the advancements in technology and maximizing the role of mechanical drawing in the progression of engineering technology poses a paramount challenge that necessitates thorough consideration and discussion within the field of mechanical drawing.

2.2 The Importance of Standardization and Normalization

The importance of standardization and normalization in engineering design and manufacturing cannot be overstated. In the field of engineering, drawing specifications and standards play an indispensable role. These specifications and standards are regarded as the common guidelines followed by the industry, ensuring the accuracy, consistency, and readability of drawings, thus providing a solid guarantee for the quality and safety of engineering projects.

Firstly, drawing specifications and standards ensure the accuracy of drawings. In the process of engineering design and manufacturing, accurate drawings form the basis for realizing design intentions and production goals. By adhering to specifications and standards, engineers can ensure that the drawings they produce comply with uniform regulations, thereby reducing design deviations or production errors caused by drawing inaccuracies.

Secondly, drawing specifications and standards promote consistency in drawings. In engineering projects, there is a large amount of drawing communication and sharing, including internal

communication within design teams and communication with suppliers and clients. By adhering to specifications and standards, all parties involved can use the same standards and language, ensuring the consistency and understandability of information, effectively promoting the smooth progress of engineering projects.

Additionally, drawing specifications and standards also ensure the readability of drawings. In the field of engineering, drawings are the primary communication tool for engineering design and manufacturing. Only when drawings are clear and legible can design intentions be accurately understood and implemented. Therefore, the provisions in specifications and standards regarding drawing formats, symbols, and annotations are crucial for ensuring the readability of drawings.

2.3 The Importance of Standardization and Normalization

Teamwork is an essential quality within the realm of real engineering projects, and it holds particular significance within the context of the mechanical drawing course. This foundational course not only equips students with technical skills but also instils in them the vital attribute of collaboration, which is indispensable in professional practice [4]. The design projects undertaken in this course often exhibit a multifaceted nature, requiring participants to harness collective insights and work collaboratively towards shared objectives. Students are thus presented with opportunities to cultivate and demonstrate their teamwork capabilities, laying the groundwork for their future roles as effective collaborators in engineering endeavors.

Within the framework of the mechanical drawing curriculum, where students are tasked with interpreting and generating intricate technical drawings, teamwork takes on a heightened importance. Effective teamwork in this context necessitates not only technical proficiency but also strong communication and coordination skills. Students must learn to engage in clear and efficient communication with their team members, facilitating the seamless exchange of ideas, information, and feedback. By doing so, they can minimize misunderstandings and conflicts, thereby optimizing workflow efficiency and project outcomes.

Furthermore, the mechanical drawing course provides a conducive environment for nurturing students' problem-solving abilities within a collaborative setting. As students encounter challenges inherent in design projects, they are encouraged to leverage collective expertise and brainstorm innovative solutions collaboratively. This collaborative problem-solving approach not only enhances the quality of project outcomes but also fosters a sense of camaraderie and mutual support among team members.

Emphasizing the importance of teamwork within the mechanical drawing curriculum serves to instill in students a deep-seated appreciation for the value of collaboration in engineering practice. By actively participating in team-based projects, students internalize the principles of solidarity, cooperation, and mutual assistance, essential attributes for success in their future careers as engineers. Moreover, the experience of overcoming obstacles and achieving shared goals fosters a sense of cohesion and belonging within the student cohort, strengthening their bonds and sense of community.

In essence, the mechanical drawing course serves as a fertile ground for cultivating teamwork skills that are essential for success in the engineering profession. By providing students with opportunities to collaborate effectively, communicate clearly, and problem-solve collaboratively, the course not only enhances their technical proficiency but also equips them with the interpersonal skills necessary for navigating complex engineering projects in the real world. Through fostering a culture of teamwork and collaboration, the mechanical drawing curriculum prepares students to excel as collaborative practitioners, capable of making meaningful contributions to the field of engineering.

3. Implementation Strategy of Ideological and Political Elements Teaching in Mechanical Drawing Courses

Ideological and political education within the mechanical drawing course serves as a crucial link in promoting students' all-round development. Effective implementation strategies can enhance teaching effectiveness and cultivate students' ideological and political qualities. Key teaching methods and approaches include:

(1) Integration into teaching content design: Teachers can integrate ideological and political education seamlessly into the mechanical drawing curriculum, enabling students to receive relevant ideological and political education alongside technical knowledge acquisition. For instance, they emphasize the significance of standardization and adherence to professional ethics, guiding students to establish correct behaviour norms.

(2) Heuristic teaching methods: Teachers can foster the innovative spirit and critical thinking skills of students by guiding them to independently explore, discover, and solve problems. They could implement heuristic teaching methods by incorporating activities such as case analysis and problem discussions, allowing students to grasp the essence of ideological and political education through practical application.

(3) Organize themed discussions and activities: Teachers regularly conduct discussions and activities focusing on ideological and political themes within the mechanical drawing course. They engage students in discussions on national policies, industry development, and professional ethics, prompting deep reflection and discourse on ideological and political issues pertinent to engineering technology advancement.

(4) Utilization of modern technology: Teachers leverage modern technology, including multimedia teaching and online platforms, to enrich teaching content and enhance its effectiveness. They disseminate ideological and political education content and ideas to students through online resources, teaching videos, and other interactive mediums to stimulate their interest and enthusiasm for learning.

(5) Emphasis on teacher-student interaction: Teachers prioritize interaction between themselves and students during the teaching process. They encourage students to pose questions, express opinions, and actively participate in case analyses and practical problem-solving exercises. Teachers guide students to recognize the significance of ideological and political education in engineering practice through active engagement and dialogue.

By implementing these strategies, educators can effectively integrate ideological and political elements into mechanical drawing courses, fostering students' holistic development and nurturing their ideological and political qualities in tandem with technical proficiency.

4. Conclusion

The ideological and political education of mechanical drawing course is a long and complicated work, which requires teachers and schools to explore and practice constantly. Through the research of this paper, we deeply discuss the implementation strategy, case analysis and empirical research results of ideological and political education of mechanical drawing course, and summarize some effective teaching methods and means. In the future, it is imperative to further strengthen the research and implementation of ideological and political education within the mechanical drawing course. By continuously refining and enhancing teaching content and methods, we aim to make significant contributions to the cultivation of socialist builders and successors who possess well-rounded development encompassing morality, intelligence, physical prowess, and aesthetic appreciation. It is our steadfast commitment to fostering the holistic growth and societal contributions of our students as they embark on their journeys toward engineering excellence and social responsibility.

Acknowledgements

This work was supported by Training and Funding Program for Young Teacher in University of Shanghai(10-24-304-004) ; 2023 Undergraduate Teaching Research and Reform Project of University of Shanghai for Science and Technology (Office of Academic Affairs, University of Shanghai for Science and Technology [2023]5); 2023 Construction Project of Undergraduate Demonstration Course with Ideological and Political Content (Office of Academic Affairs, University of Shanghai for Science and Technology [2023]18).

References

[1] Cui Yuanyuan, Niu Tianye, Weng Shuo, Zhu Wenbo. (2023) Research on the Integration of Ideological and Political Elements into Mechanical Drawing Courses. Advances in Educational Technology and Psychology, 7, 137-141.
[2] Yang Lei, Lu Junjie. (2024) Case-based mining of ideological and political elements in engineering drawing. Modern Business Trade Industry, 6, 258-260.
[3] Ma Wenqiang, Li Xiaoxiao. (2024) Present situation of curriculum ideology and politics in cartographic teaching of science and engineering in colleges and universities and countermeasures for improvement. Henan Education (Higher Education), 1, 73-75.
[4] Li Shuangshuang. (2023) Research on the integration of ideological and political elements into teaching practice of Engineering Drawing C2 course. University, 29, 138-142.