Journal of Contemporary Educational Research, 2025, Volume 9, Issue 1
http://ojs.bbwpublisher.com/index.php/JCER
ISSN Online: 2208-8474
ISSN Print: 2208-8466

Teaching Reform of Communication Application Development Course under the Background of Engineering Education Accreditation

Yuejin Cai*, Langtao Hu

School of Electronic Engineering and Intelligent Manufacturing, Anqing Normal University, Anqing 246133, Anhui Province, China

Corresponding author: Yuejin Cai, cai_yj456@163.com

Abstract: This study focuses on the teaching reform of the communication application development course based on the core requirements of engineering education accreditation. To address key challenges such as the disconnection between software and hardware teaching and insufficient practical skills among students, a project-driven "learning-practice-application" teaching model is proposed. By optimizing course content, innovating teaching methods, and introducing university-industry collaboration mechanisms, the reform aligns the curriculum more closely with engineering education standards and industry demands. The approach significantly enhances students' comprehensive skills, practical abilities, and employability. This study provides theoretical foundations and practical strategies for the teaching reform of courses in communication engineering.

Keywords: Engineering education accreditation; Communication application development; Teaching reform; Software-hardware integration; University-industry collaboration

Online publication: February 12, 2025

1. Introduction

Engineering education accreditation, as an important global trend in the field of engineering education, aims to cultivate high-quality engineering professionals capable of addressing complex engineering problems and competing internationally [1-3]. Against this backdrop, the communication application development course, as one of the core courses in the communication engineering discipline, plays a pivotal role in enhancing students' comprehensive skills and achieving the objectives of engineering education accreditation [4,5].

The rapid advancement of communication technology imposes higher demands on engineering talent, requiring students to possess diverse skills in software development, hardware design, and system integration. However, traditional course content often lags behind technological developments, with insufficiently designed practical components and significant gaps between academic training and industry requirements. This situation

not only hinders the development of students' abilities to solve complex engineering problems but also undermines their career competitiveness. Consequently, there is an urgent need for systematic teaching reforms to establish a more scientific and reasonable curriculum system and teaching methodologies, providing students with a more effective and industry-relevant learning experience [6,7].

This study aims to explore and implement a project-driven teaching model grounded in the principles of engineering education accreditation. The goal is to enhance students' comprehensive practical skills and interdisciplinary problem-solving abilities, offering robust support for improving the communication application development course.

2. Current teaching status and analysis

2.1. Teaching status and background analysis

The core objective of engineering education is to cultivate high-quality engineering professionals with innovation and practical abilities. The communication application development course, as an essential component of the communication engineering discipline, covers various fields such as web development and embedded system design. It is a critical course for students to build their professional knowledge base and enhance their practical skills. However, the current curriculum suffers from outdated content and relatively traditional teaching methods, creating a significant gap with the rapidly evolving demands of the industry.

The lag in curriculum content and limitations in teaching methodologies directly impact the cultivation of students' comprehensive capabilities, particularly in addressing complex engineering problems. Traditional teaching models fail to incorporate cutting-edge industry technologies promptly, and students lack opportunities to connect their learning with real-world engineering applications. This disconnect undermines the effectiveness of the course in fostering innovation and practical abilities. Systematic teaching reforms are urgently needed to align the curriculum more closely with the goals and requirements of engineering education accreditation.

2.2. Key issues

The current communication application development course faces two primary challenges: the disconnect between software and hardware teaching and insufficient student practical skills. Firstly, in traditional communication engineering education, application development and hardware design courses are often taught independently. This separation makes it difficult for students to effectively integrate software and hardware knowledge. Such a disconnect hampers the holistic development of students' competencies and falls short of meeting the interdisciplinary integration requirements of engineering education accreditation. In modern communication engineering practice, solving complex engineering problems often demands seamless collaboration between software and hardware technologies. Therefore, introducing interdisciplinary integration into teaching is imperative to help students master the skills required for collaborative software-hardware development.

Secondly, the existing teaching model places excessive emphasis on theoretical knowledge, neglecting the design and implementation of practical components. This traditional approach results in students struggling to apply theoretical knowledge to real-world scenarios, failing to meet the industry's high expectations for practical problem-solving and operational skills. The lack of sufficient practical opportunities leaves students underprepared for independent operation and teamwork in real engineering projects. To address this issue, it is essential to enhance practical components in the curriculum, offering students hands-on experiences through real projects or simulated scenarios. This approach will comprehensively improve their practical abilities and

overall competencies.

3. Teaching reform

3.1. Teaching model design and curriculum integration

Innovating teaching models and integrating curriculum content are central goals of teaching reform, focusing on providing students with a comprehensive and application-oriented learning experience. Based on extensive literature research and case studies, this study proposes a "learn-practice-apply" teaching model, systematically designed for the communication application development course. This model encompasses content such as web front-end development, smart terminal development technologies, Java programming, microcontroller principles and applications, and embedded system design, ensuring strong alignment between the curriculum and real-world projects.

The model also emphasizes interdisciplinary knowledge integration and collaborative learning, enabling students to acquire comprehensive knowledge from different disciplines to tackle complex engineering problems. To achieve this, the curriculum content has been meticulously integrated to form a cohesive syllabus that transitions students from theoretical learning to practical project application. Through systematic course design, students are equipped to master key skills in software development, hardware design, and embedded systems, achieving deep integration of software and hardware in project practice and significantly enhancing their overall competence.

3.2. Project practice design and application scenario simulation

The design of practical components is a critical aspect of teaching reform, aiming to provide students with extensive hands-on experience through real or simulated application scenarios. Based on the course content, this study has designed several comprehensive projects with significant challenges and practical relevance. These projects span multiple levels, from software development to embedded system design, and are integrated throughout the teaching process to ensure students gain a deep understanding and flexible application of their knowledge during project practice.

Additionally, considering the characteristics of practical applications in communication engineering, various simulated scenarios have been developed, such as communication system simulations and small-scale communication device development. These scenarios help students closely connect theoretical knowledge with real-world applications. Within these contexts, students not only experience the challenges of real engineering but also enhance their logical analysis and innovative abilities as they solve actual problems. This practice-based teaching method effectively improves students' problem-solving skills and engineering literacy, laying a solid foundation for their future career development.

3.3. University-industry collaboration

University-industry collaboration provides crucial support for teaching reform by introducing enterprise resources and industry expertise, further enhancing the practicality and forward-looking nature of the curriculum. Joint development of real projects by schools and enterprises offers students invaluable practical opportunities. Under the guidance of industry mentors, students deeply engage in project development, gaining a comprehensive understanding of industry needs and workflows, thereby strengthening their professional skills and employability.

Moreover, university-industry collaboration offers a scientific basis for dynamically adjusting course

content. Through close communication with industry experts, schools can stay informed about industry trends and technological demands, ensuring that teaching content keeps pace with the times. This constructive interaction not only improves the adaptability of the curriculum but also provides strong support for cultivating high-quality, application-oriented talents tailored to industry needs.

4. Conclusion

Under the framework of engineering education accreditation, the teaching reform of the communication application development course serves as a critical pathway to improving student capabilities and teaching quality. This study addresses key challenges such as the disconnect between software and hardware instruction and insufficient practical skills by optimizing course content, innovating teaching models, and strengthening university-industry collaboration. These efforts have significantly enhanced students' comprehensive competencies and adaptability to professional environments.

In the future, this research will further refine the teaching model, continuously monitor industry technological advancements, and incorporate more forward-looking content into the curriculum design. These initiatives aim to deepen the integration of engineering education with industry needs, providing stronger support for cultivating high-quality, application-oriented talents in the field of communication engineering.

Funding

(1) Quality Engineering Project of Higher Education Institutions in Anhui Province (2023aqnujyxm26, 2023sx060, 2023zyxwjxalk124)
(2) Natural Science Key Research Project for Higher Education Institutions of Anhui Province (2024AH051117, 2024AH051126)
(3) Excellent Young Backbone Teachers' Domestic and Foreign Visiting and Training Program in Universities (gxgnfx20220262022)
(4) Research and Industrialization Project of High Precision Positioning System for Intelligent Connected Vehicles

Disclosure statement

The authors declare no conflict of interest.

References

[1] Cheng X, Qian F, 2024, Integrated Practice Curriculum and Moral Education in Engineering Education: Cultivating Quality Engineers for Sustainable Development. Journal of Higher Education Teaching, 1(6): 32–37.
[2] Wang F, Wang X,2024, Teaching Reform in the Context of Engineering Education Accreditation—Taking the Mechanical Design, Manufacturing and Automation Major as an Example. Advances in Educational Technology and Psychology, 8(1): 1–8.
[3] Ren X, Yin H, Tang Y, et al., 2023, Construction of Innovative Ability Evaluation System for College Students Inspired by Engineering Education Accreditation. Frontiers in Educational Research, 6(24): 7–11.
[4] Francese R, Gravino C, Risi M, et al., 2015, Using Project-Based-Learning in a Mobile Application Development

Course—An Experience Report. Journal of Visual Languages Computing, 31: 196–205.

[5] Hamuy E, Galaz M, 2010, Information Versus Communication in Course Management System Participation. Computers & Education, 54(1): 169–177.

[6] Wang J, Odell SJ, Klecka CL, et al., 2010, Understanding Teacher Education Reform. Journal of Teacher Education, 61(5): 395–402.

[7] Bruns B, Macdonald HI, Schneider RB, 2019, The Politics of Quality Reforms and the Challenges for SDGs in Education. World Development, 118: 27–38.