Region-Educational Research and Reviews, 2025,Volume 7, Issue 12
DOI:10.32629/rerr.v7i12.4998
ISSN Online:2661-4634
ISSN Print:2661-4626

# Practical Exploration of Multi-stage Integration and Innovation Reform of Electronic Technology Course under the Background of New Engineering

**Yan Zhang ,Pnpan Yuan ,Wei Zhou ,Wei Huang ,Qian Shi**
Xinjiang Agricultural University

**Abstract :** According to the problems of incoherence, non-coordination and non-synchronization in the teaching reform and construction of electronic technology course, this paper focuses on the core objectives of " cross-integration, practical innovation, industry-education coordination and moral education " of new engineering. The course adopts the OBE teaching concept of " result-oriented, student-centered and continuous improvement, " and carries out multi-dimensional teaching reform and practice from the aspects of teaching system and content, teaching resources and mode, curriculum ideological and political education and design, teaching effect and evaluation. By using modern educational information technology and platform, all teaching elements are coordinated, unified, and complemented with each other to form a new engineering construction as the core. The two-wheel drive of virtue shaping and skill training, the new paradigm of education with three-stage integration of knowledge reconstruction, value guidance and ability migration.

**Keywords:** new engineering, electronic technology, multi-stage integration, curriculum ideological and political

## 1. Introduction

As a basic course of engineering specialty, electronic technology plays an important role in cultivating modern technical talents [1]. In recent years, many colleges and universities have responded to the call of curriculum reform and explored the path of teaching innovation[2]. Lan Haijiang et al.[3] put forward the curriculum teaching reform of the " three integration " concept of theory, simulation and practice, and achieved good teaching efficiency and quality. Yan et al.[4] used the comparative research method to reform the teaching mode of work-integrated learning led by the craftsman spirit, which strengthened the integration and cultivation of students ' engineering literacy and professional spirit. Peng Xiaodong et al.[5] explored the ideological and political teaching of electronic technology courses to achieve the same direction of knowledge transfer and value guidance. Xing Xuefeng[6] is committed to exploring the application of PBL teaching mode in classroom teaching, which improves students ' learning enthusiasm and enthusiasm. Han Ming et al.[7] clearly pointed out that firmly establishing the concept of new engineering education and implementing the cultivation of high-quality engineering and technical professionals in new engineering are the fundamental tasks entrusted by the times to the education of engineering majors in colleges and universities.

However, these teaching reform measures focus on the single-dimensional reform of teaching methods or course content, and lack of training programs throughout the whole chain. [8] Based on the actual situation of local colleges and

universities, this study takes the electronic technology course as the carrier, through the three-stage path of ' value guidance-knowledge reconstruction-ability transfer ', constructs the support system of ' moral shaping + skill forging ', and realizes the deep integration of curriculum ideological and political education and professional education.

## 2. The current situation of course teaching

At present, the channels for teachers and students to receive information are increasingly diversified, the speed of knowledge updating is significantly accelerated, the breadth and depth of knowledge are continuously expanded, and the learning characteristics of students and the requirements of teachers ' teaching have changed significantly. For the course of electronic technology, students have basic theoretical knowledge of basic circuits, can skillfully use electronic equipment, and have strong practical ability. However, there are still the following problems in the course : First, the contradiction between students ' knowledge reserve and flexible use is inconsistent. The lack of mining in the practical application of the course theory makes the course stiff. Secondly, the contradiction between students ' love of electronic equipment and their love of electronic courses is not coordinated. In the process of learning, with the improvement of learning depth, students are afraid of difficulties, lack of opportunities to actively learn and explore electronic technology problems, and the learning effect is difficult to guarantee. Finally, the contradiction between students ' ability level and ideological and political literacy is not synchronized. Traditional teaching ignores the cultivation of students ' personality and value orientation, and students ' enthusiasm for specialty is not high.

## 3. Reform path

### 3.1 Promote the transformation of the curriculum from a single discipline to the ' electronic + ' mode

Based on the concept of " cross-integration " of new engineering, electronic technology integrates materials science, physics, computer science and other disciplines from the perspective of skill training [9]. According to the characteristics of students ' learning, from pre-class preparation, classroom participation, experimental training, curriculum design, innovation competition to graduation design, according to the division of labor and cooperation, giving full play to the advantages, extending the training chain, reshaping the connection of various teaching links, promoting the transformation of the curriculum from a single discipline to the " electronic + " mode, realizing the consistency and consistency of training behavior, and improving students ' learning effectiveness.

### 3.2 Strengthen the path from knowledge to practice

Focusing on the construction of " new engineering " and the goal of professional certification, the implementation of teaching activities in and out of class, and the cultivation of teaching practice in and out of school are carried out. To carry out the mixed teaching activities of in-class and out-of-class deep integration in the school : extracurricular warm-up, improve students ' independent thinking ability ; the teaching goal of integrating engineering cases to cultivate students ' scientific spirit and patriotic feelings ; extracurricular through online homework and answering questions, offline hands-on practice to solve problems and expand learning. Outside the school to participate in enterprise research, production practice, internal and external theory and practice teaching environment, to solve the students' ' learning-use ' contradiction.

### 3.3 Improve the application of digital teaching platform

According to the learning characteristics of the students in our school, through the self-built SPOC characteristic courses, the high-quality MOOC resources are integrated, and the online students establish the knowledge framework according to the established objectives ; the offline multi-dimensional teaching mode of teachers, students analyze problems from multiple perspectives, and construct a three-dimensional teaching environment ; according to the characteristics of the course, the problem of electronic equipment introduction is introduced, which not only solves the problem of " learning-using " incoherence, but also achieves the learning effect of " joy-hot, " and synchronizes the " morality-ability " double practice.

### 3.4 Create the driving force from ' doing questions ' to ' creating things '

In order to cope with the current discipline integration and the key of " sticking neck, " the application of electronic technology has become the focus of scientific research at present, and the difficulties of the project are solved on the basis of " Diantong Future " and popularization of basic knowledge. According to the students' learning progress, selective participation in project research. This initiative improves the depth of students ' learning, ' moral-ability ' synchronization, but also solves the coherence and consistency of learning to use.

### 3.5 Shaping technical ethics and national feelings

The course fully considers the characteristics of college students ' emotions, attitudes and psychological needs, takes typical electronic products as the object, extracts the quality requirements of excellent engineering talents from the socialist core values, and excavates the connotation of professional spirit from the mission and professional quality of engineers. The six-dimensional curriculum ideological and political goal framework proposed by is implemented into curriculum teaching : guiding students ' value speculation with hot spots as clues before class; in the class, the abstract ideological and political goals are transformed into teaching activities shaped by specific operational behaviors; after class, questionnaire survey, students ' self-evaluation and mutual evaluation were used to test the effectiveness of ideological and political education. Promote continuous improvement and iteration of the curriculum, enhance students ' sense of acquisition, and ensure the consistency of educational objectives with teaching activities and teaching evaluation.

### 3.6 Form a diversified evaluation system, strengthen the process of assessment

The assessment increases the process assessment with flexible and colorful classroom activities. To mobilize the initiative and enthusiasm of learning to increase the performance assessment of classroom and experimental teaching ; with creativity, pay attention to the teaching process development design homework.

## 4. Construction effectiveness

### 4.1 Students ' participation has been significantly improved

Through the questionnaire survey, 98 % of the students think that the multi-dimensional ' electronic + ' teaching mode is better than the traditional offline teaching mode. 80 % of the students think that the use of multi-mode teaching, the mastery of knowledge is better than expected. 90 % of the students ' interest in the course has been improved to a certain extent. Since the development of multi-mode teaching methods, students ' online discussion and offline participation have been significantly improved, the learning process feedback is good, and the learning initiative is obvious.

### 4.2 Steady improvement in assessment results

Through the comparison of academic performance in the past two years, the average scores of the reformed assessment have increased by 5.47 points and 2.88 points respectively, and the failure rates have decreased by 28 % and 22.86 % respectively. The diversification of assessment methods has improved students ' participation and formed a diversification of students ' learning methods, making students 100 % involved, and the assessment results are fair and more convincing.

### 4.3 Benefits increased year by year

After four phases of reform and practice, the course has established a dedicated SPOC course. The number of students ' elective classes has increased gradually. In the fourth phase, the cumulative number of electives is 503, and the cumulative number of interactions is 2555. In the last semester, there were 372 test assignments, 1137 online interactions, and 16 assessments. The qualified rate of online learning in the class was 93 %.

### 4.4 Students ' practical ability is outstanding

Since the development of multi-dimensional hybrid teaching methods, the concept of ' electronic + ' technology has been vigorously promoted in the college. The robot competition hosted by the college every year attracts hundreds of students to participate. The number of participating teams is increasing year by year, and students have achieved good results in various scientific and technological innovation competitions.

## 5. Conclusion

Through the implementation of the above reform path, the course has achieved remarkable results in stimulating students ' interest in learning, improving their comprehensive ability, and promoting interdisciplinary integration. In the future, we will continue to deepen the reform of education and teaching, constantly optimize the curriculum system and teaching mode, continue to explore the innovative application of ' electronic + intelligent agriculture ' and more fields, and strive to cultivate more compound new engineering talents with solid professional quality, innovative spirit and practical ability to meet the development needs of the new era, so as to contribute more to serving the national strategy and local economic and social development.


## Fund Project:

Undergraduate Education Teaching Research and Reform Project of Higher Education Institutions in Xinjiang Uygur Autonomous Region（XJGXJGPTA-2025008）: Construction and Practice of a Smart Teaching System for Electronic Technology Courses Based on Dynamic Knowledge Graphs


## References


[1] Notice of the General Office of the Ministry of Education on Announcing the First Batch of ' Emerging Engineering ' Research and Practice Projects No.17, March 15, 2018.

[2] Speech at the National Conference on Undergraduate Education in Colleges and Universities in the New Era [J].China 's Higher Education.2018.6.21 : 4-10.

[3] Haijiang Lan, Yuju Zeng, et al. Teaching reform of electronic technology course based on the concept of " three integration " [J]Teaching and educating people (Higher Education Forum). 2023 (15) : 100-103.

[4] Jun Yan, Huanghui Zhou. Research on the reform of the teaching mode of the integration of engineering and learning in the electronic technology course led by the craftsman spirit [J] China Educational Technology Equipment. 2023 (17) : 89-91.

[5] Xiaodong Peng, Wenfeng Zhao, et al. Exploration on Ideological and Political Teaching of Electronic Technology Foundation Course [J].University.2024 (06) : 110-113.

[6] Xuefeng Xing.Exploration of PBL mode teaching reform in the course of ' Electronic Technology ' [J].Education and Teaching Forum.2024 (09) : 64-66.

[7] Ming Han, Hongxia Wang, et al. Research on the teaching reform of electronic technology experiment course from the perspective of new engineering [J].Henan Education (Higher Education). 2024 (08) : 79-80.

[8] Haibo Wang, Yan Huo. Wait. The curriculum reform of " Analog Electronic Technology " for the construction of " New Engineering " [J]. Journal of Electrical and Electronic Teaching. 2025, 47 (03) : 42-45.

[9] Feng Jiang. Exploration on the reform practice of analog electronic technology course ' N + 1 ' under the background of new engineering [J].Journal of Higher Education.2024,34 : 143-146.