# Research on the New Form Loose-Leaf Equipment Practice Textbooks Under the Modular Concept

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**Abstract.** Against the backdrop of the in-depth transformation of vocational education toward quality improvement, excellence cultivation, and integration of production and education in the new era, traditional equipment practice textbooks are confronted with problems such as complex types, rigid forms, and lagging content, which are incompatible with job requirements and technological development. To address these dilemmas, this paper conducts research on the reconstruction of new form loose-leaf equipment practice textbooks under the modular concept, based on the laws of equipment practice teaching and the requirements of core job competencies. The textbook construction follows a five-stage process of "demand analysis - framework design - content compilation - resource integration - iterative update". By modularly integrating knowledge and skills, constructing a three-dimensional system of "paper textbooks + digital resources", and establishing a dynamic iterative update mechanism, the accurate alignment between teaching content and job requirements is achieved. Teaching practice applications show that the textbook has significantly improved students' practical operation ability, problem-solving ability, and independent learning ability. The textbook reconstruction path and practical model constructed in this paper provide useful reference for the reform of textbooks for equipment-related courses in vocational education.

**Keywords:** Loose-leaf; Modularization; Practical Textbooks

## 1 Introduction

Against the backdrop of the in-depth advancement of education reform in the new era, vocational education, as a key component of China's education system, is embracing a transformation opportunity centered on improving quality and cultivating excellence, and integrating production and education. Meanwhile, it is also facing severe challenges where the textbook system is incompatible with job requirements and technological development.[1] The national government attaches great importance to the innovation of vocational education textbooks, and a series of relevant policies have been issued intensively, which not only establish an institutional guarantee system for


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the construction of new form loose-leaf textbooks but also point out the direction for the innovative development of equipment practice textbooks.[2] Based on the laws of equipment practice teaching and job requirements, this paper deeply explores the reconstruction path of new form loose-leaf equipment practice textbooks under the modular concept. Through the application of this textbook, the pertinence and effectiveness of equipment practice teaching are comprehensively improved, helping students proficiently master core practical skills, enhance their ability to solve practical problems in complex environments, and ultimately achieve the talent training goal from "knowledge acquisition" to "competence development".

## 2 Current Status of Existing Equipment Practice Textbooks

With the in-depth advancement of education reform in the new era, vocational education, as an important part of China's education system, is in a transformation stage focusing on improving quality and cultivating excellence, and integrating production and education. As a core link in cultivating new-type technical talents, equipment practice teaching directly aligns with job competence requirements, and the quality of its textbooks has a direct impact on the pertinence and effectiveness of talent training.[3] However, existing traditional equipment practice textbooks have gradually exposed many in-depth problems during long-term use, as detailed below:

### 2.1 Complex Types of Practice Textbooks and Insufficient Usability

To cover different practice links such as equipment operation, maintenance, and application, and meet the needs of diverse practical teaching content, traditional practical teaching requires supporting multiple types of textbooks, including atlases, internship guidelines, maintenance procedures, performance parameter manuals, auxiliary maintenance manuals, full-function application manuals, fault databases, case libraries, and practice report books. For some complex equipment, the number of supporting textbooks can even exceed 10.[4] These textbooks are independent of each other and lack effective linkage. During practice, students need to frequently flip through and search for corresponding content, which not only disrupts the continuity of the teaching process but also easily leads to omissions in operation steps and logical interruptions.[5] Obviously, such a complex textbook system is difficult to accurately match the teaching implementation process, seriously affecting the efficiency and quality of practical teaching.

### 2.2 Rigid and Single Textbook Form, Difficulty in Highlighting Student-Centered Learning

Traditional practice textbooks adopt the disciplinary compilation logic of theoretical textbooks, with the cataloging method of "volume, chapter, section, and item", and consist of preface, table of contents, main text, thinking questions, and references as the

main components.[6] This traditional "teaching-oriented" design is difficult to meet the characteristics of practical teaching such as "integration of theory and practice" and "on-the-job practice", and cannot support modern teaching concepts such as "student-centered learning", "collaborative inquiry", and "personalization", nor can it meet students' independent learning needs. As a result, students' learning initiative is insufficient, and the improvement of practical ability is limited.[7]

### 2.3 Lagging Update of Textbook Content, Disconnection from Job Requirements

Traditional textbooks have a long compilation cycle and cumbersome revision processes, with an average update cycle of 3-5 years. However, the iteration speed of equipment technology continues to accelerate, new technologies and applications emerge constantly, and job requirements are also dynamically adjusted.[8] Traditional textbooks lack an effective dynamic update mechanism, making it difficult to quickly absorb the latest achievements in technological theory innovation, equipment technological upgrading, and application training practice. This leads to a significant time lag between textbook content and actual job requirements, failing to meet the training requirements of new-type technical talents in the new era.

## 3 Construction Path of New Form Loose-Leaf Equipment Practice Textbooks

The construction of new form loose-leaf equipment practice textbooks strictly follows the five-stage process of "demand analysis - framework design - content compilation - resource integration - iterative update", ensuring the scientificity, standardization, and systematicness of the construction process.

### 3.1 Demand Analysis

Demand analysis is the basic link of textbook construction, with the core of clarifying the four key issues: "what to teach", "what to learn", "how to teach", and "how to learn". Through various research methods such as questionnaires, teacher seminars, and job surveys, demand information is extensively collected from three parties: students, teachers, and employers, providing accurate basis for subsequent textbook construction.

### 3.2 Framework Design

Based on the results of demand analysis, the overall framework of the textbook is constructed. Firstly, curriculum courses are set around core job competencies; secondly, modular division is carried out to clarify the core content and logical connection of each module; thirdly, content is arranged in accordance with the progressive logic of "basic skills - single skills - composite skills - comprehensive on-the-job skills", which

is consistent with students' cognitive laws; finally, a textbook mind map is drawn to visually present the overall framework of the textbook, module composition, and the correlation between knowledge points and skill points.

### 3.3 Content Compilation

A diversified compilation team composed of enterprise experts, frontline teachers, and educational technology experts is established, with clear division of labor and compilation standards. Among them, enterprise experts are mainly responsible for providing practical on-the-job cases, fault handling experience, and the latest industry practice achievements to ensure that the textbook content is highly consistent with job requirements; frontline teachers are mainly responsible for transforming enterprise practical experience into teaching content, arranging knowledge and skill points in accordance with modular logic, and designing teaching activities and evaluation links to ensure that the textbook conforms to teaching implementation laws (e.g., transforming fault handling processes into step-by-step standardized operation procedures); educational technology experts are mainly responsible for guiding the development and integration of digital resources, designing the presentation form of the textbook, optimizing teaching activities, and integrating ideological and political education elements, so as to improve the usability and informatization level of the textbook.

### 3.4 Resource Integration

A three-dimensional textbook system of "paper textbook + digital resources" is constructed. Core digital resources include various types such as teaching videos, animation demonstrations, virtual simulations, and online test questions. Teaching videos cover operation demonstration videos, principle explanation videos, case analysis videos, etc., such as instrument operation skill videos, performance parameter testing method videos, and equipment application videos in complex environments. Each teaching video is controlled within 5-10 minutes to facilitate students' fragmented learning; 3D animation demonstrations are mainly used to display abstract content such as equipment structure, workflow, parameter measurement, and optimized operation, enhancing the intuitiveness of the content; virtual simulations focus on developing content that is difficult to carry out in actual equipment training, such as high-risk operations, complex processes, and fault simulations, reducing the risks and costs of actual equipment training; online test questions include basic knowledge questions, skill application questions, and comprehensive ability questions, allowing students to conduct self-assessment and practice after class, make up for weaknesses independently, and consolidate learning achievements. The resource presentation adopts the "QR code + online platform" model. QR codes are marked next to the corresponding content in the paper textbook, enabling students to quickly access relevant digital resources by scanning the code for anytime and anywhere learning; at the same time, a digital resource management platform is built to classify, update, and maintain resources, providing functions such as resource retrieval, download, and interactive communication. Students can submit learning questions and participate in discussions

on the platform, while teachers can issue learning tasks and view learning data, ensuring the availability and security of resources.

### 3.5 Iterative Update

A dynamic cycle update mechanism of "compilation - trial use - feedback - revision" is established. During the trial use of the textbook, feedback opinions from students, teachers, and employers on textbook content, arrangement logic, resource allocation, and use effect are collected through various methods such as classroom observation, teacher-student interviews, questionnaires, and enterprise evaluations. Targeted questionnaires are designed to evaluate from dimensions such as content practicality, arrangement rationality, resource richness, and usability; in the revision and improvement stage, the textbook content is adjusted, supplemented, and optimized according to feedback opinions, including adjusting the module arrangement order to adapt to the teaching process and updating digital resources to improve quality. Combined with factors such as the development of new technologies, new practical cases, and changes in job requirements, the textbook is fully revised every 1-2 years to ensure that it always maintains vitality and adaptability.

## 4 Construction Effects of New Form Loose-Leaf Equipment Practice Textbooks

In the spring semester of 2025, the new form loose-leaf equipment practice textbook was fully adopted in the teaching of the "Equipment Principles and Applications" course for a major at XX College. Through various evaluation methods such as classroom observation, process recording, questionnaires, and interview surveys, a comprehensive analysis of the application effect of the textbook was conducted. The results show that the application of the textbook has achieved remarkable effects, with specific data shown in Table 1 and Table 2:

**Table 1.** Student Comprehensive Competence Improvement Effect Table.

| Indicator Name | Application Effect |
|---|---|
| Average completion time of tasks in the actual equipment stage | Reduced 13% |
| Average time for whole-machine fault handling | Reduced 15% |
| Accuracy of fault location | Improved 23% |
| Pre-class preview completion rate | Increased from 62% to 97% |
| Participation rate in after-class extended learning | Increased from 45% to 85% |

**Table 2.** Teaching Quality Optimization Effect Table.

| Indicator Name | Application Effect |
|---|---|
| Teachers' recognition of the textbook | 92% |
| Proportion of teachers using mixed teaching methods | 90.5% |
| Number of teaching innovation cases | Increased 60% |

| | |
|---|---|
| Students' course satisfaction | 89% |
| Excellent and good rate in course assessment | 95% |
| Excellent rate in course assessment | 30% |
| Classroom participation | Increase 40% |
| Alignment between textbook content and job requirements | 90% |
| Employers' satisfaction with graduates | Increased from 78% to 91% |

### 4.1 Significant Improvement in Students' Comprehensive Competence

In terms of practical operation ability, students' standardization of equipment operation, accuracy of parameter measurement, and efficiency of completing practical tasks have all been significantly improved. In the actual equipment stage assessment, the average time for students to complete tasks has been reduced by 13%; in terms of problem-solving ability, students can analyze fault causes more quickly and accurately and propose solutions in the whole-machine fault maintenance practice, with the average fault handling time reduced by 15% and the accuracy of fault location improved by 23%; in terms of independent learning ability, the pre-class preview completion rate of students has increased from 62% to 97%, and the participation rate in after-class extended learning has increased from 45% to 85%. Most students can carry out targeted learning according to their own knowledge and skill weaknesses.

### 4.2 Continuous Optimization of Teaching Quality and Effect

In terms of the improvement of teachers' teaching ability, the recognition of the new textbook by teachers has reached 92%. Most teachers actively use modular content and digital resources to design teaching activities, making teaching methods more diversified and the classroom atmosphere more active. Among the 22 participating teachers, 18 can proficiently use mixed teaching methods, accounting for 90.5%, and the number of teaching innovation cases has increased by 60% compared with previous years; in terms of the improvement of students' learning effects, students' learning enthusiasm and initiative have been significantly enhanced, with a course satisfaction rate of 89%, an excellent and good rate in course assessment of 95%, and an excellent rate increased from 15% to 30%. Students' interest in practical teaching has been significantly improved, and the average classroom participation has increased by 40%; in terms of the alignment between teaching and jobs, feedback from employers shows that the alignment between textbook content and job requirements is 90%, and employers' satisfaction with graduates has increased from 78% to 91%, believing that graduates can adapt to on-the-job work more quickly.

## 5 Conclusion

Aiming at the practical problems of traditional equipment practice textbooks such as complex types, rigid forms, and lagging content, this paper follows the objective laws of vocational education development and military talent growth, and combines the core

characteristics of equipment practice courses such as "integration of theory and practice" and "on-the-job experience". It breaks the traditional "chapter-section" compilation mode of textbooks and innovatively adopts the construction idea of "integrated design of content and teaching methods, modular integration of knowledge content, and loose-leaf binding of textbook form". This realizes the accurate matching of textbooks with the teaching implementation process and the convenient update of cutting-edge cases and achievements, providing useful experience for continuously strengthening curriculum teaching reform and textbook optimization. In the next step, we will continue to improve the construction of online course resources, strengthen the construction of the online course supervision and evaluation system, and expand the application level and scope of online courses to better serve the training of new-type talents.

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