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Research on the Application of Guiding Text Teaching Method in Vocational Education——Taking the course of "Fundamentals and Skills of Electronic Technology" as an example

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Abstract

With the rapid development of vocational education and the deepening of industrial upgrading, vocational education, as an important battlefield for culti-vating technical and skilled talents, has made innovation and reform of its teaching mode particularly important. As a student-centered teaching model that emphasizes self-directed learning and problem-solving abilities, the guiding text teaching method has been widely applied and popularized in vocational ed-ucation in Germany. However, it has not been widely applied in the field of vo-cational education in China and is still in its infancy and exploration stage. This article aims to explore the specific application and effectiveness of the guided text teaching method in the course of "Electronic Technology Fundamentals and Skills" in secondary vocational education. Through a research method combin-ing theory and practice, it provides reference and guidance for the curriculum reform and teaching quality improvement of secondary vocational education.

Keywords

Vocational Education; Guiding Literature Teaching Method; Vocational Education Curriculum; Fundamentals and Skills of Electronic Technology

1. Background and significance of the research

In October 2022, General Secretary Xi Jinping pointed out in the report of the 20th National Congress of the Communist Party of China: "We will coordinate the innovation of vocational education, higher education, and continuing education, promote the integration of vocational and general education, industry and education, and science and education, and optimize the positioning of vocational education types."[1]Vocational education emphasizes practicality and applicability, and requires a teaching method that can guide students to actively explore, practice, and

innovate. The guiding text teaching method was initially applied to the training program at Daimler Benz factory in Germany in the 1970s.[2]In the 1980s, the guiding text teaching method was applied to curriculum teaching and introduced to China. In recent years, it has been widely applied in vocational education both domestically and internationally. As a student-centered teaching model that emphasizes the cultivation of practical abilities, the guiding text teaching method guides students to actively explore knowledge, analyze problems, and solve problems through the design of structured learning task books (i.e. guiding texts), thereby mastering skills and improving abilities in practice. The guiding text teaching method has advantages such as student-centered approach, emphasis on cultivating practical abilities, stimulating learning interest, and enhancing comprehensive abilities.

With the rapid development of modern electronic information technology, many universities have opened electronic technology related courses for non electrical majors.[3] As a fundamental course for electronic technology majors, "Fundamentals and Skills of Electronic Technology" is of great significance for students to master the basic knowledge of electronic technology, cultivate practical abilities, and innovative thinking. Under the traditional teaching mode, students often find it difficult to understand and master the course knowledge points, resulting in poor learning outcomes. Therefore, applying the guiding text teaching method to the teaching of the course "Fundamentals and Skills of Electronic Technology" has important practical value and practical significance.

This study conducts an in-depth analysis and summary of the specific application process and effects of the guided text teaching method in the classroom teaching of the "Diode and Its Application" chapter in the textbook "Fundamentals and Skills of Electronic Technology", and extracts a teaching mode and experience suitable for the characteristics of secondary vocational education. These experiences and models can provide reference and guidance for other vocational schools and teachers in teaching reform, promoting innovation and development of vocational education teaching models.

The guiding text teaching method can not only overcome the limitations of traditional teaching models, but also cultivate students' various abilities, improve teaching effectiveness and quality, and promote the integration of vocational education and industry. Therefore, the guiding text teaching method should be actively promoted and applied in vocational education and curriculum teaching.

2. Current research status at home and abroad

2.1. Abroad Research Status

The guiding text teaching method was born in Germany in the 1970s, and its initial stage was set in the metal processing training program at Daimler Benz Gagno factory[4]. Teurlings, C.C.J. (1990) deeply recognized that ignoring the diversity and differences among workers and enforcing a unified training pace would lead to a se-

ries of problems[5]. Therefore, he began to improve the project training method in order to adapt more flexibly to the learning needs of different workers. Subsequently, Straka G.A. (1997) made further adjustments based on this, directly reflecting the learning progress and understanding level of students through small tests. In this process, the questions designed by the trainer to guide students to think and control their learning direction are actually the embryonic form of the guiding text, laying the foundation for the birth of the guiding text teaching method. Subsequently, this innovative teaching method quickly spread within the industry, and was adopted and further developed by Ford's Cologne branch and Salzgitter Steel Company in Germany. Subsequently, many well-known enterprises such as the Fuerzburg factory in Heidenheim, the German railway system, and the Borussia Dortmund steel company also followed suit and adopted the guided text teaching method as the core means of their vocational training, promoting the continuous evolution of this teaching method in practice[6].

As one of the foundations of semiconductor devices, diodes can be traced back to the research on semiconductor materials in the early 20th century. Since the first proposal and experimental verification of vacuum diodes by British physicist John Ambrose Fleming in 1904, the development of diodes has undergone a significant transition from vacuum tubes to solid-state semiconductor materials. Especially after World War II, with the widespread application of semiconductor materials such as silicon and germanium, the manufacturing technology of diodes made breakthrough progress and gradually became an indispensable core component in the electronics industry. In Hufri's research, the practicality of the basic electronic module with creative thinking ability for integrating diode circuit themes and their applications was determined. The data collection tools used were the lecturer's verification table and practicality test table, and the product and data analysis techniques used were product effectiveness analysis and product practicality analysis [7].

2.2. Domestic research status

Guiding text teaching method, also known as "project-based guiding text teaching method" by many scholars in China[8]. As early as the 1980s, the guided text teaching method had been incorporated into China's education system and sparked a widespread and in-depth research boom in the country, involving multiple levels and dimensions. Dong Chengren[9] (1997) not only deeply analyzed the limitations of traditional vocational education teaching in China, but also systematically expounded the core concepts and operational methods of the guiding text teaching method. Yan Zhonghua[10] (2009) believes that the writing of guiding texts is the key to the implementation of this teaching method and is also a necessary teaching document for this teaching method. Wang Yan [11] (2008) innovatively integrated behavior guided teaching method into the teaching practice of Photoshop course, emphasizing the important value of this teaching method in cultivating students'

key abilities. This contribution marks the beginning of the application of guided text teaching method in the field of course teaching. Han Liya [12](2019) has made meaningful explorations in the field of medical education by flexibly applying the guided text teaching method to case teaching in internal medicine nursing. Through this teaching model, she focuses on cultivating students' self-learning ability and strengthening their ability to combine theoretical knowledge with clinical practice.

Semiconductors have the characteristics of energy saving, small size, fast response, and long lifespan. They have a sturdy appearance, strong indication, excellent monochrome function, and strong light mixing ability. In the article "Exploration of Light Emitting Diodes and Their Applications" by Ye Chan [13] (2014), the working principle and application technology of diodes were summarized. She elaborated on the application process of light-emitting diodes (LEDs), which fully demonstrates the essence of microfabrication technology. Cheng Situo[14] (2015) summarized the characteristics of light-emitting diodes (LEDs) and proposed that LEDs mainly have the advantages of long service life, simple, bright and eye-catching light color, strong brightness of light divergence, multiple color types, good reaction performance, and low work requirements. Subsequently, he explored the application status of single point emitting LEDs, combination display LEDs, planar lattice LEDs, and LEDs placed in outdoor tubes.

3. Research content and methods

This study explores the applicability and feasibility of using guided text teaching method in the course of "Electronic Technology Fundamentals and Skills" in vocational schools through teaching practice in previous vocational classrooms. The specific research content mainly includes the research preparation stage, pre research stage, research process, and research summary stage.

This study explores in depth the specific application of the guided text teaching method in the field of secondary vocational education, especially the practical effect in the key professional teaching content of "diodes and their applications" in the textbook "Fundamentals and Skills of Electronic Technology". The research method mainly adopts practical verification in real teaching situations, explores the process of diode teaching in vocational colleges, and comprehensively uses educational research methods such as research integration, action research, and questionnaire survey to study the application of guided text teaching method in diode courses in vocational colleges.

4. Core concepts and theoretical basis

4.1. Definition of related concepts

Guiding text teaching method is a teaching method that uses a specialized teaching document, namely guiding text (often in the form of guiding questions), to guide

students to learn and work independently through work plans and self-control of the work process. The introductory text consists of a series of guiding questions with a guiding nature. By reading the steps presented in the guide, students can clarify their learning objectives, gain a clear understanding of the tasks to be completed, the knowledge to be learned, and the skills to be mastered.

Through this method, students can plan and operate a complex workflow, independently developing plans, executing work, and checking results. Therefore, the guiding text teaching method is still a practical and comprehensive teaching method. Teaching guidance documents generally consist of descriptions of tasks and objectives, guiding questions, quality control sheets, content and time for completing tasks, work quality checklists, and coaching instructions. There are three types of teaching guidance documents: project work guidance documents, knowledge and skills teaching guidance documents, and job description guidance documents. The forms of guidance articles include: electronic design task book, component data manual, work manual, work advice instrument operation guide, technical information, guidance questions, guidance case, etc. The design process of teaching guidance documents includes selecting tasks, planning assignments, categorizing knowledge, generating information sources, and completing problem design.

4.2. Related theoretical basis

Constructivist theory emphasizes the active construction of knowledge and the integration of individual experience, believing that learning is a dynamic process that occurs through the interaction of learners with external information based on existing cognitive structures. The guiding text teaching method guides students to explore independently and learn collaboratively through pre-set guiding questions or tasks, promoting the internalization and application of knowledge. The high degree of theoretical compatibility between the two provides a solid foundation for their mutual integration. Constructivism provides theoretical guidance for the guiding text teaching method, and the guiding text teaching method is the vivid practice of constructivist concepts in specific teaching.

The pragmatic educational theory emphasizes that education should be student-centered, pay attention to individual differences and interests of students, and encourage students to actively learn. The guiding text teaching method also adheres to this concept, guiding students to explore independently and learn collaboratively through pre-set guiding questions or tasks, so that students are always in a dominant position in the learning process. The core concepts of the two are highly compatible, jointly promoting the development of students' initiative and creativity.

The action experience learning theory suggests that learning is a dynamic and continuous process. Under this theoretical framework, the guiding text teaching method positions the teacher's role as an assistant in the learning process, and each guiding question designed closely revolves around the current educational environment and

students' existing knowledge and experience, deeply reflecting the core concept of knowledge restructuring and reconstruction in experiential learning theory. In this process, action and experience complement each other, jointly driving the progressive transformation of the cognitive structure within students' brains, presenting a spiral upward development trend.

The core concept of non directive teaching theory is to cultivate individuals who are unique, distinctive in personality, and brave in expressing themselves. The directive teaching method precisely fits the essence of non directive teaching, encouraging students to engage in diverse thinking around problems, be brave in trying and making mistakes, and learn from them.

5. Feasibility Analysis of Guiding Text Teaching Method in the Course of "Fundamentals and Skills of Electronic Technology"

Learning tasks are more specific: The guiding text teaching method provides students with clear goals and directions in the learning process through carefully designed guiding questions or tasks. In the classroom teaching of "diodes and their applications", these introductory texts can revolve around the basic principles, characteristics, and application circuits of diodes, breaking down complex knowledge points into a series of specific and actionable tasks. In this way, students can clearly know what they need to learn and master, thus avoiding the blindness and arbitrariness of learning.

Effectively enhancing students' learning enthusiasm: The guiding text teaching method emphasizes students' subject status and encourages them to complete tasks through self-directed learning, collaborative exploration, and other methods. This teaching method can stimulate students' curiosity and thirst for knowledge, enabling them to gain a sense of achievement and satisfaction in the process of problem-solving. In the course of "Electronic Technology and Fundamentals and Skills", designing practical and challenging guidance questions can stimulate students' interest and enthusiasm for learning, and encourage them to actively participate in learning.

Effective enhancement of professional abilities: "Fundamentals and Skills of Electronic Technology" is a fundamental course for vocational electronics majors, aimed at cultivating students' practical abilities and professional qualities. The guiding text teaching method simulates real work scenarios and tasks, enabling students to continuously improve their vocational skills and comprehensive qualities in the process of solving practical problems. For example, practical tasks such as designing circuit construction and troubleshooting can exercise students' hands-on and problem-solving abilities; Completing tasks through teamwork can cultivate students' teamwork and communication skills.

Improving teaching efficiency through multiple evaluations: Traditional teaching evaluations often use exam scores as the sole criterion, ignoring students' perfor-

mance and efforts in the learning process. The guiding text teaching method emphasizes multiple evaluations, that is, comprehensive evaluation of students' learning outcomes through various methods. In the course of "Fundamentals and Skills of Electronic Technology", various evaluation methods such as experimental reports, group discussions, and work exhibitions can be used to comprehensively assess students' learning attitudes, knowledge mastery, practical abilities, and innovation abilities.

6. Teaching Implementation and Result Analysis

This study conducted comparative practical teaching in two classes of the 2024 Electronic Technology Application major at Xiqing District Vocational School in Tianjin. The number of students in both classes is 40, and the gender ratio is quite balanced. Electronic 2401 class, as an experimental class, adopts guided text teaching method for diode teaching, closely integrating theoretical and practical courses to achieve integrated teaching, that is, integrating the imparting and explanation of theoretical knowledge into practical activities. Figure 5-1 shows the teaching situation of the experimental class; The electronic 2402 class serves as a control class, using traditional teaching methods to teach diode knowledge. Theoretical knowledge is taught first, followed by practical experiments. When teaching diode knowledge in two classes, a unified textbook is used and carefully planned to ensure that key elements such as teaching environment and progress remain consistent. Through this measure, we strive to control potential interfering variables to the maximum extent possible, thereby ensuring the accuracy and reliability of experimental results.

The course types of the control class are divided into new teaching and experimental classes. The new teaching process includes "pre class organization preparation - introducing new courses - teaching new courses - classroom exercises - summarizing and evaluating" and other content. It mainly demonstrates, explains in detail, and analyzes the learned content to students through teaching and presentation. Experimental classes are arranged after theoretical lectures, mainly to test students' ability to apply theoretical knowledge in practical operations.

The experimental class designs teaching based on the characteristics of the guiding text teaching method, and implements teaching according to the stages of "task release - information acquisition - design process - decision making - implementation process - inspection process - summary and evaluation". Guiding questions are usually actionable events related to the learning content. For experimental class teaching, firstly, the teacher assists students in grouping according to the principle of "heterogeneity within the group and homogeneity between groups", with each group consisting of about 3-4 people. The cooperative learning mode of grouping plays an auxiliary role in guiding text teaching. In the actual teaching process, teachers actively create an atmosphere of self-directed learning, provide students

with sufficient exploration space, and encourage them to independently explore learning resources. Students actively communicate and discuss within the group, delving deeper into learning around carefully designed guiding questions. Teachers provide timely guidance and guidance, aiming to stimulate students' subjective initiative and fully leverage their subject status in the learning process.

In terms of assessment methods, the control class adopts the traditional approach of "classroom attendance+regular performance+final exams" for comprehensive evaluation; The experimental class is comprehensively evaluated through student self-evaluation, group peer evaluation, teacher evaluation, guidance on problem-solving, and assessment tests.

After a semester of experimental teaching, the experimental class and the control class showed significant differences in the learning effectiveness, interest and attitude, methods and habits, and even comprehensive literacy of diode knowledge. Under the guidance of problem orientation, students in the experimental class significantly enhanced their hands-on practice and problem-solving abilities, and their academic performance also improved accordingly. More importantly, some students experience a sense of achievement and self-identity while completing tasks, which further stimulates their interest in diode teaching content and forms a virtuous cycle of learning and progress. This study provides strong evidence that the guided text teaching method not only conforms to the learning characteristics of vocational school students, but also meets the teaching objectives and needs of vocational education. As long as the task book for guiding problems is designed properly, it can effectively promote the comprehensive development of students, enhance their intrinsic learning motivation, improve their diverse abilities, and better meet the demand for vocational talents in society.

The final evaluation of teaching effectiveness showed that the application of guided text teaching method not only significantly improved the confidence and interest of vocational school students in learning the course of "Electronic Technology Fundamentals and Skills", but also had a positive impact on their comprehensive abilities, providing strong practical support for the curriculum reform and teaching quality improvement of vocational education.

7. Future Prospects

As a widely applicable teaching method, the guiding text teaching method has demonstrated its unique advantages in multiple disciplinary fields. In order to further explore the effectiveness of the guided text teaching method in teaching practice in the future, we can adopt the following strategies to expand and improve our research:

The primary task is to expand the sample size of the survey to enhance the representativeness of the research. Specifically, future research can follow one of the following two approaches or a combination of both: one is to cross multiple schools,

select students from different classes, establish experimental and control classes, and use them as a basis for comparative practical course teaching; Secondly, within a single school, multiple classes are selected and multiple controlled experiments are designed to implement and guide teaching practices related to literature based teaching methods, in order to collect data more comprehensively.

Secondly, the scope of curriculum coverage should be expanded. In order to verify the universal applicability of the guiding text teaching method, future research should extend this teaching method to a wider range of disciplinary fields. Through practical application in different disciplines, not only can its effectiveness be tested in their respective fields, but it can also provide valuable reference for other disciplines that may potentially adopt this teaching method.

Finally, researchers should actively explore solutions to the issue of high time costs that may arise from the use of guided text teaching methods. Given that this teaching method requires students to invest more time in completing learning tasks, future research could consider integrating other teaching methods or utilizing modern teaching tools to optimize the learning process, thereby effectively alleviating time pressure while ensuring teaching quality, and enabling students to achieve maximum learning outcomes within limited time.

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