The Construction of Food Chemistry and Analysis Curriculum under the Background of Job Course Competition and Certification

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Abstract. Food Physical and Chemical Analysis" is a crucial core course in the field of food inspection and testing technology. Based on the analysis of students' situations, we have reconstructed the curriculum system, with real work tasks as the foundation and project-oriented, task-driven, and outcome-oriented principles as the guiding principles. In the process of restructuring the course content, we place students at the core, integrate the educational concept of "integration of work, courses, competitions, and certifications," and incorporate actual job positions, competition requirements, and certificate certifications into the teaching content, always adhering to the goal of cultivating both moral qualities and professional skills in food safety guardians. In the teaching process, we have implemented the "exploration, guidance, instruction, reinforcement, and evaluation" seven-step approach, and deeply explored the ideological and political education elements in the curriculum. We have adopted the "three entries and four steps" curriculum ideology and politics teaching model to ensure the integration of ideological and political education throughout the entire teaching process. Additionally, we have utilized a "diversified+multi-dimensional" evaluation method, combining process evaluation, outcome evaluation, and value-added evaluation. Practice has proven that through this curriculum reform, students' learning initiative has been improved, knowledge has been deepened, skills have been strengthened, and qualities have been internalized. The teaching quality has been enhanced.

Keywords: Vocational teaching and research; Food analysis; Course construction.

1 Introduction

General Secretary Xi Jinping proposed in the report of the 19th National Congress of the Communist Party of China to "promote the construction of a Healthy China and prioritize the protection of the people's health" and "strengthen food and drug safety supervision". The food inspection and testing technology major focuses on the development of the top ten emerging industries in Anhui province, specifically the green food industry. The mission of food inspection personnel is to build a strong defense line

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for food safety, safeguard "safety on the tip of the tongue", and contribute to the construction of a Healthy China. "Food Physical and Chemical Analysis" emphasizes the cultivation of students' practical abilities and comprehensive qualities while aligning with the work requirements of food inspection and testing positions. The goal is to cultivate high-quality technical and skilled personnel who possess moral, intellectual, physical, aesthetic, and labor competencies.

2 Experimental design

2.1 Analyzing questionnaire survey data to accurately analyze students' situations.

Theoretical knowledge and basic skills of the students are solid, but their ability to transfer knowledge is weak. The course is targeted at second-year students majoring in food inspection and testing technology. Through prerequisite courses, the students have already acquired theoretical knowledge of analysis and testing, and they can complete basic experimental skills operations. Based on the questionnaire survey, students urgently hope to improve their hands-on operational and data processing abilities through practical exercises in order to better solve real-world problems. The students exhibit strong interest in hands-on practical exercises, but their ability to analyze and solve problems is weak. Post-2000s students are mentally active, value learning experiences, are highly interested in real work projects and practical exercises, and prefer teaching methods that integrate theory and practice. However, their ability to independently complete complete testing work is weak. The students' career inclinations mainly lie in food technology development and application, food marketing, and analysis and testing. The students already possess basic professional qualities, but their proactivity in learning and work ethic are relatively weak. Additionally, due to differences in the students' backgrounds, their theoretical foundations vary and are inconsistent. Please refer to Table 1 for a detailed analysis of the students' situations.

Table 1. Analysis of the students' situations

Analysis Dimension	Student Situation Analysis	Response Strategy
Knowledge and Skill Foundation	Has studied“Inorganic and analytical chemistry”, “Chemical experimental technology”, “Instrumental analysis and training” courses, the basic knowledge of food testing, the basic knowledge of common analytical instruments have a certain degree of mastery; Can operate simulation software to better assist practical exercises	It adopts group cooperation to carry out independent inquiry and discussion, makes full use of existing teaching resources, and actively promotes the integration of theory and practice teaching

Cognitive and Practical Abilities	Can use the cloud platform to complete the learning of teaching resources independently, like interactive group learning, with independent learning ability, can be skilled in basic experimental skills and operation of conventional analytical instruments	Make full use of information technology, online and offline hybrid teaching, through the creation of situations, stimulate students' interest, guide students to think, improve students' ability to solve practical problems
Learning Characteristics	Pay attention to learning experience, eager to real work link, perceptual cognitive ability, like hands-on practice; lack of the spirit of excellence, can not persevere, weak research spirit	Pay attention to process evaluation and value-added evaluation, actively encourage students and enhance students' learning initiative.

2.2 Researching the demand for food testing positions and restructuring teaching content

Based on the needs of food industry transformation and upgrading[1], new requirements[2] for professional positions such as agricultural product food inspectors in new industries, formats, and models are being addressed. This is to meet the demand of high-quality technical and skilled personnel for the high-quality development of the food industry, improve the quality of talent training, and reconstruct the content of food physical and chemical inspection textbooks. The work projects of food industry enterprise food inspection and food quality control positions are used as carriers, and the work process is guided to sort out the corresponding knowledge, skills, and qualities of the work tasks. The modular design is based on vocational skills training, and the teaching content is restructured to achieve the integration of work and study, and the integration of knowledge and practice.

The curriculum design adheres to the principle of student-centeredness, follows the cognitive and vocational ability development rules of students, and based on the work links and processes of physical and chemical testing, with basic skills training as the core and comprehensive vocational ability development as the leading factor. It focuses on cultivating students' learning ability, practical ability, and innovative ability[3]. In the process of curriculum reconstruction, the concept of integrating education and talent cultivation is followed, which integrates job-related courses, skills competitions, and certificates into the teaching content of food physical and chemical inspection courses[4]. The content includes the core skills of food testing positions, the contents of agricultural product quality and safety testing skills competition, and the content of 1+X food inspection management vocational skill certificate[5].

The curriculum reconstruction is divided into eight major modules, with projects listed side by side to enhance students' skills. For example, Module 7 - Milk and Dairy Product Inspection is reconstructed into four tasks: sensory inspection, rapid inspection, physical and chemical inspection, and large-scale instrument inspection. The

implementation of each task revolves around key core steps such as selecting sample testing methods, sample pretreatment, sample testing, data processing, and result analysis. Through a blended teaching mode combining online and offline methods, ideological and political education is integrated throughout the implementation process of teaching tasks. Please refer to Figure 1 for the reconstruction of teaching.

3 Course teaching implementation process

3.1 Task-driven implementation of the seven-step teaching model

By optimizing the structured teaching team and restructuring the curriculum system, through the "blended" teaching mode [6], real-world projects from enterprises are introduced into the classroom. Information technology is fully utilized, and ideological and political education is integrated to strengthen students' scientific thinking and practical skills development. The goal is to cultivate highly skilled talents in food testing who have a wide range of professional knowledge, strong practical abilities, and high professional qualities. With a student-centered approach, a seven-step instructional design is implemented: pre-class exploration, introduction of new knowledge, task introduction, effective teaching methods, reinforcement training, diverse and multidimensional evaluation, and post-class expansion of learning. The focus is on strengthening students' practical skills and cultivating good professional ethics.

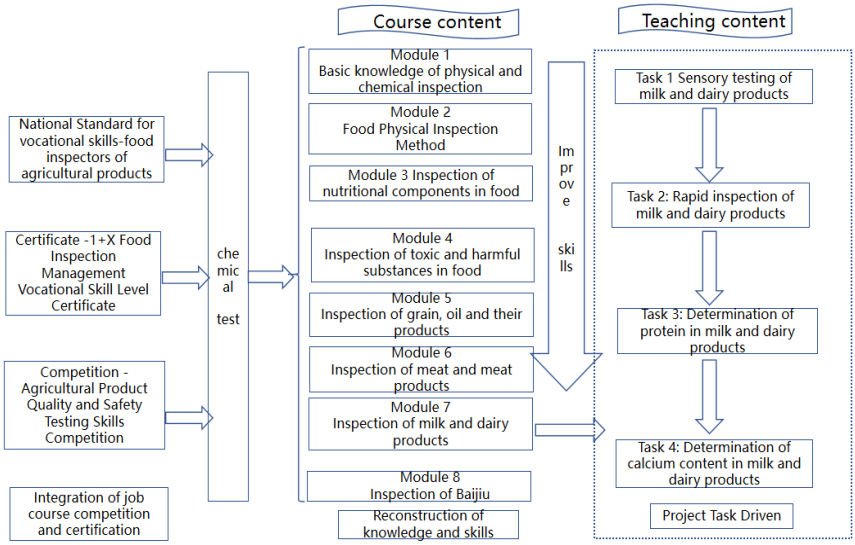

Fig. 1. Overall Teaching Design

Taking the task of detecting calcium content in milk as an example, the implementation process of teaching is shown in Figure 2. Prior to class, teaching resources are pushed through the cloud platform, and pre-learning tasks are assigned. The learning data is used to understand students' pre-learning status and dynamically adjust class-

room teaching. In the class, a scenario is created where students act as dairy quality inspectors to detect the calcium content in milk, arousing their interest in learning and setting the stage for teaching tasks. During the implementation of the tasks, information technology is used to deepen knowledge, reinforcement training is conducted to enhance skills, and ideological and political education is integrated to internalize professional ethics. Comprehensive evaluation is conducted for the entire teaching process. Extension tasks are published on the cloud platform to consolidate and deepen the learned knowledge.

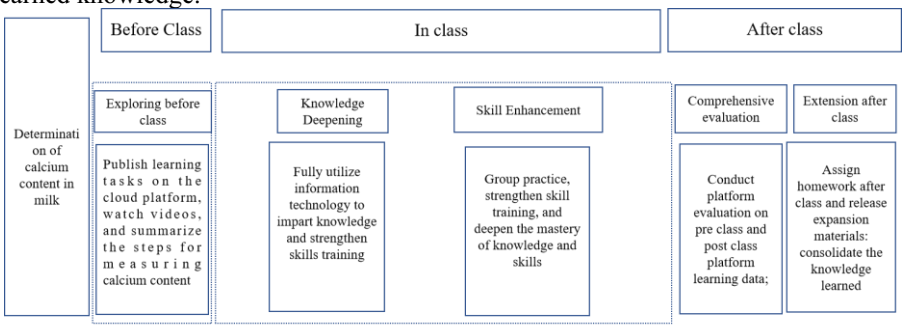

Fig. 2. Specific Teaching Implementation Process

3.2 Digging into ideological and political elements in the curriculum, incorporating morality into teaching

By thoroughly reviewing the teaching content of milk and dairy product inspection, determining the teaching focus, and exploring ideological and political elements, the glorious mission of "strengthening milk production and revitalizing agriculture", the responsibility of reviving the planting and dairy industry, cultivating the spirit of hard work and excellence, the craftsmanship spirit of "guarding milk safety", and the mission of "safeguarding the nation's physical fitness" are determined as the ideological and political focus[7-9]. For example, in the task of determining protein content in milk, through introducing the development of China's dairy industry and dairy enterprises, students' patriotism is cultivated to shoulder the mission of revitalizing the dairy industry. Through the melamine incident, protein testing standards are introduced to cultivate students' awareness of safety and the rule of law. During the practical training of protein determination, students' concepts of health, safety, and environmental protection are developed, and standardized operating habits are cultivated[10-12].

4 Conclusions

During the teaching implementation process, virtual simulation software can be used to assist practical teaching. Additionally, an open laboratory management mechanism can be gradually explored, allowing students to access the laboratory during their free time by applying to use it. With the help of laboratory administrators, students can carry out

practical research projects, stimulating their interest in learning and improving teaching effectiveness. At the same time, in order to adapt to the transformation and upgrading of the food industry, the curriculum content should be dynamically adjusted according to the development of the food industry. New technologies, methods, and standards in food testing should be continuously integrated into the curriculum teaching process. Collaborative development of loose-leaf textbooks with enterprises will further align with job standards in food testing positions and keep updating teaching content.

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