Exploration of Mining and Integration Paths of Ideological and Political Elements in the Food Quality and Safety Major.

Chang Li*, Xiaoyi Yang, Mingjuan Wang, Jing Peng, Yi Zhou, Haiyan Yu

Sichuan Vocational and Technical College, Suining, 629099, China
**Corresponding author: m18227554185@163.com*

Abstract: *The Food Quality and Safety major bears the dual mission of safeguarding public health and maintaining industry credibility. Its knowledge system contains scientific spirit, ethical awareness, and sense of responsibility, which constitute natural resources for the construction of ideological and political education within the curriculum. This study, based on the interdisciplinary attribute of "liberal arts, science, and engineering" of this major, systematically explores the mining and integration paths of ideological and political elements in the curriculum. The research first explains the intrinsic characteristics and logical rationale of ideological and political education within the curriculum from three dimensions: the value implications of the knowledge system, the isomorphic relationship between core competencies and educational elements, and the professional adaptability of integration. It then proposes three mining strategies: identification of implicit value factors based on the curriculum knowledge modules, extraction of the spiritual lineage from the discipline's development history and technological evolution, and dimensions of value analysis in professional norms and ethical dilemmas. On this basis, it constructs an integrated path composed of three interconnected components: a curriculum objective system that integrates cognition and value, a teaching content organization with structured value presentation, and a teaching process mechanism that dynamically couples cognitive activities with value formation. This study aims to provide a theoretical basis and an operational framework for achieving the intrinsic unity of knowledge transmission and value guidance in the Food Quality and Safety major.*

Keywords: *Food Quality and Safety; Ideological and Political Education within the Curriculum; Mining of Value Elements; Integration Paths; Professional Adaptability*

Introduction

The Food Quality and Safety major, as an interdisciplinary applied discipline, focuses on talent cultivation that is not only concerned with the transmission of professional knowledge and skills but also directly influences the value judgments and behavioral choices of practitioners in complex industry contexts. This major covers the entire industry chain from raw material production to final consumption, and the professional attitude, ethical awareness, and sense of responsibility of practitioners have a decisive impact on the effectiveness of quality assurance and risk prevention and control. However, professional education and value guidance have long been in a relatively separate state, with value elements existing in the curriculum system in an additive and externally embedded manner, failing to truly integrate into the intrinsic logic of professional knowledge. In view of the current situation that most existing research focuses on macro-level theoretical interpretations while lacking in-depth exploration based on the specific knowledge logic of this discipline, this study, grounded in the knowledge structure and teaching principles of this major, systematically explores three levels: connotative characteristics, mining strategies, and integration paths, in order to provide a theoretically adaptable reference for the construction of ideological and political education within the curriculum.

1. The Connotative Characteristics and Logical Rationale of Ideological and Political Education within the Curriculum for the Food Quality and Safety Major

1.1 The Value Implications Embedded in the Knowledge System of the Food Quality and Safety Major

The curriculum system of the Food Quality and Safety major centers on courses such as Food Biochemistry, Food Microbiology, Food Toxicology, Food Technology, and Food Safety Supervision and Management. The knowledge core of this system naturally contains value dimensions including responsibility for public health, pursuit of scientific truth, and adherence to professional ethics. For example, in the teaching of food additives, the instruction involves not only the physicochemical properties and functional classifications but also embodies the scientific understanding of the dialectical relationship between "dose and toxicity" and the respect for the rigor of regulatory standards. In the teaching of food safety risk analysis, the instruction demonstrates reverence for human health and the safeguarding of social public interests. These value elements are not external to the knowledge system but are embedded within technical principles, process designs, and testing standards, thereby constituting an indispensable ethical foundation of professional knowledge[1].

Upon further examination, the knowledge system of this major also embodies the scientific spirit of seeking truth and pragmatism as well as the craftsman concept of continuous improvement. From the identification of subtle differences in sensory evaluation to the rigorous data requirements of precision instrument analysis, each link demonstrates the ultimate pursuit of accuracy and reliability. This professional attitude of strictly adhering to technical specifications and being highly responsible for test results itself represents a profound value embodiment. Therefore, professional knowledge and value connotations exhibit a high degree of symbiosis within the curriculum system, providing rich internal resources for subsequent element mining.

1.2 The Isomorphic Relationship Between Professional Core Competencies and Educational Elements

The Food Quality and Safety major is committed to cultivating students' abilities in quality control and safety risk assessment across the entire chain from farm to table. The composition of such professional core competencies shares an essential isomorphic relationship with the sense of responsibility, scientific spirit, and ethical judgment found in educational elements. The "precision analysis" emphasized by professional competencies corresponds to the rigorous and realistic scientific attitude at the educational level; the "process control" required by the competencies reflects respect for rules and adherence to procedural justice. This isomorphism determines that professional education and value guidance share a high degree of consistency in their objectives, rather than being a simple superposition of two independent systems, thereby enabling the two to be synergistically realized within the same teaching process.

From the perspective of the deeper logic of competency cultivation, the systematic thinking and complex problem-solving abilities required by this major are naturally associated with a holistic perspective and dialectical analysis methods. When students face comprehensive issues such as food traceability, adulteration detection, and safety early warning, they need not only to mobilize multidisciplinary knowledge but also to possess the value judgment capability of weighing pros and cons, respecting facts, and taking responsibility. The attainment of professional core competencies essentially requires students to internalize a comprehensive quality that is based on professional knowledge yet transcends the purely technical level while mastering technical operations. The formation process of this quality constitutes the intrinsic mechanism of the deep integration between educational elements and professional competencies.

1.3 The Professional Adaptability and Pedagogical Basis for the Integration of Ideological and Political Education into the Curriculum

The integration of ideological and political education into the curriculum should not be a rigid application of a general model; instead, it must achieve precise transformation based on the knowledge structure and cognitive laws of the Food Quality and Safety major to ensure professional adaptability. This major has a typical interdisciplinary attribute of "liberal arts, science, and engineering," encompassing both the abstraction of basic natural sciences and the practical orientation of applied technology and industry management. This determines that the integration of value elements needs to

follow the intrinsic logic of the discipline. In theoretical teaching, the integration points should be located at the intersection of scientific principles and ethical constraints; in technical teaching, the integration should focus on the junction of operating procedures and responsibility commitment. Only by being rooted in the genetic logic of professional knowledge can value guidance become a catalyst for deepening professional understanding rather than an external component that increases cognitive load[2].

At the pedagogical level, the deep integration of ideological and political education into the curriculum for this major requires the construction of a teaching mechanism that unifies cognition and value. Based on constructivist learning theory, the formation of students' professional values should not be the result of one-way indoctrination but rather an active process of construction through case analysis, experimental inquiry, project-based learning, and other methods in specific professional contexts. For example, in the course of Food Standards and Regulations, guiding students to explore the scientific basis and social trade-offs behind standard setting enables them to achieve value identification simultaneously while understanding professional knowledge. Therefore, the design of integration paths for ideological and political education within the curriculum should focus on promoting the meaning construction of professional knowledge and the internalization of values. Through teaching strategies such as context creation, task-driven learning, and reflective evaluation, the design achieves the organic unity of knowledge transmission, ability cultivation, and value shaping.

2. Classification and Mining Strategies of Ideological and Political Elements within the Curriculum for the Food Quality and Safety Major

2.1 Identification of Implicit Value Factors Based on Curriculum Knowledge Modules

The curriculum system of the Food Quality and Safety major can be divided into categories such as basic theories, detection techniques, process control, standards and regulations, and supervision and management according to knowledge modules. Each type of knowledge module contains identifiable implicit value factors. In the basic theory module, the structure-function relationships of substances involved in Food Biochemistry and the microbial ecological balance involved in Food Microbiology have their knowledge cores embedded with respect for natural laws and reverence for living systems. In the detection technique module, the rigor of sample pretreatment and the precision requirements of instrumental analysis imply the reverence for objective facts and the adherence to technical specifications. The identification of these value factors requires one to deeply analyze the intrinsic logical structure of each knowledge module and to identify the natural intersection between scientific cognition and value judgment.

An effective path for identifying implicit value factors lies in constructing a "knowledge-value" correlation matrix, which systematically maps course knowledge points to their potential value connotations. For the process control module, such as the analysis of critical control points in food processing, its essence is the systematic management of risks, reflecting the value orientation of forward-looking responsibility and prevention first. For the standards and regulations module, such as the basis for formulating national food safety standards and the requirements for their implementation, the module carries the unity of scientific principles and public interests. Through such a systematic knowledge-ontology-based review, the value elements originally scattered across various course modules can be made explicit, providing a clear element list and logical basis for subsequent integration path design[3].

2.2 Extraction of the Spiritual Lineage from the Discipline's Development History and Technological Evolution

The development history of the Food Quality and Safety discipline is essentially an intellectual evolution history, in which technological innovations respond to social demands and scientific cognition safeguards public health. This history contains a spiritual lineage that can be extracted. From the early reliance on sensory experience for quality identification, to the establishment of modern chemical analysis methods, and then to the application of contemporary molecular biology and high-throughput detection technologies, each technological transition has been accompanied by a shift in the paradigm of scientific inquiry and a deepening of professional understanding. Throughout this evolutionary process, the relentless pursuit of detection limits by disciplinary pioneers, their prudent assessment of unknown risks, and their clear awareness of technological limitations constitute the

spiritual core that supports the continuous development of the discipline.

The methodology for extracting this spiritual lineage lies in abstracting value orientations that transcend specific technologies from the key nodes of technological breakthroughs. For example, from the iterative evolution of pathogenic bacteria detection methods, one can extract the persistent spirit of continuous optimization of sensitivity and specificity; from the transformation process of risk assessment theory from qualitative to quantitative approaches, one can refine the thinking paradigm that equally emphasizes scientific decision-making and transparent communication. This spiritual lineage is not a static historical memory but an academic gene that dynamically acts upon the current teaching process. By integrating it into the curriculum teaching content, educators enable students to comprehend the scientific spirit and professional integrity underlying the discipline’s development while understanding the technical principles.

2.3 Dimensions of Value Analysis in Professional Norms and Ethical Dilemmas

The food industry has established a multi-level normative system covering production specifications, quality control, safety evaluation, and information labeling. These norms are not only the basis for technical operations but also the institutionalized expression of industry value consensus. In specific processes such as food safety management system certification, implementation of good production practices, and compliance review of product labels, the norms themselves embody respect for consumer rights, the maintenance of fair trade, and the requirement for transparency. By analyzing these professional norms from the value dimension, one can extract core values such as the spirit of contract, responsibility ethics, and professional self-discipline embedded within them, thereby providing value materials rooted in authentic industry contexts for curriculum teaching.

The ethical dilemmas that objectively exist in industry practice provide a more contemplative and in-depth dimension for value analysis. The balance between "necessity" and "safety" in the use of food additives, the trade-off between "timeliness" and "accuracy" in risk warning, and the boundary demarcation between "information transparency" and "trade secrets" in supply chain traceability—these real dilemmas without simple answers require practitioners to possess advanced value judgment capabilities. Introducing these ethical dilemmas into teaching contexts and guiding students to conduct multi-dimensional analyses based on professional knowledge helps cultivate their ability to make responsible decisions in complex situations, thereby transforming value elements from abstract concepts into operational and debatable professional practice issues[4].

3. Construction and Implementation of Integration Paths for Ideological and Political Education within the Curriculum for the Food Quality and Safety Major

3.1 Bidirectional Integration of Cognition and Value in the Curriculum Objective System

The construction of the curriculum objective system serves as the starting point of the integration paths, and its core lies in achieving a bidirectional integration of the cognitive dimension and the value dimension, rather than a simple juxtaposition of the two. Cognitive objectives involve the understanding of food biochemistry principles, the mastery of detection techniques, the application of quality and safety control methods, and other professional competency levels; value objectives encompass the cultivation of scientific attitudes, the development of ethical awareness, the shaping of a sense of responsibility, and other character-building levels. Bidirectional integration requires that, when formulating curriculum objectives, value elements serve as the internal support for achieving cognitive objectives, while cognitive deepening serves as the foundational condition for value generation. For example, in the Food Toxicology course, the cognitive objective of "being able to independently complete the quantitative analysis of target substances in complex matrices" can be organically coupled with the value objective of "cultivating a rigorous attitude toward the accuracy of testing data," so that the two support each other and are synergistically achieved in the teaching process.

From the overall perspective of the curriculum system, bidirectional integration also requires the establishment of a logical progression among objective levels. At the basic course stage, the focus can be placed on cultivating scientific spirit and normative awareness, with value objectives targeting the recognition and identification of basic professional ethics. At the core professional course stage, the integration should strengthen ethical judgment and systematic thinking, guiding students to perform multi-dimensional trade-offs when facing complex technical problems. At the expansion and comprehensive course stage, the integration can be elevated to the level of innovative character and

industry responsibility, enabling students to form higher-order value judgment capabilities when addressing cutting-edge or comprehensive issues. This layered and progressive objective integration approach allows the integration of cognition and value to run through the entire professional cultivation process, forming a development trajectory from shallow to deep and from lower to higher levels in a spiral manner[5].

3.2 Structured Design of Teaching Content Organization and Value Presentation

The structured design of teaching content is a key link in achieving the effective presentation of value elements, and its core lies in organically embedding the identified value factors into the logical framework of the knowledge system. Different from the simple addition of value labels, the structured design requires, based on the intrinsic relationships of the course knowledge, placing value elements at appropriate knowledge nodes so that they become an integral part of understanding professional content and solving professional problems. In the Food Technology course, one can take "the setting of safety margins in process parameter selection" as a knowledge node, and introduce at this node the value orientation of scientific prudence, enabling students to understand the necessity of safety redundancy while learning process principles. In the Food Toxicology course, one can focus on the core concept of "dose-response relationship" to integrate the scientific and objective value attitude into the teaching process of toxicological data interpretation.

Structured design also requires attention to the intrinsic relationships and presentation sequences among different value elements, thereby forming a logic of value presentation that aligns with students' cognitive patterns. Based on the cognitive progression laws of professional courses, one can organize the presentation order of value elements from concrete to abstract and from simple to comprehensive. At the initial stage of a course, one can convey the fundamental attitude of rigor and pragmatism through technical specifications and operating procedures. In the middle stage of the course, one can guide students to understand the interactive relationship between science and ethics through case analysis and scenario analysis. At the advanced stage of the course, one can promote students to form a systematic and dialectical professional value system through comprehensive projects and discussions on cutting-edge issues. This value presentation sequence that follows cognitive logic enables students to complete the construction of their value system simultaneously while gradually deepening their professional understanding[6].

3.3 Dynamic Coupling Mechanism of Teaching Process Interaction and Value Internalization

The design of teaching process interaction plays a decisive role in value internalization, and its essence lies in constructing a dynamic coupling mechanism between cognitive activities and value generation. Teaching interaction includes not only the question-and-answer exchanges between teachers and students but also covers the interaction between students and knowledge contexts, the collaborative discussions among students, and the dialogical relationship between students and professional norms as well as professional ethics. In the teaching of Food Quality Management, one can design a group discussion session and conduct multi-role simulation centered on the construction of a supply chain traceability system. This enables students, through interactions in which they play different roles such as producer, tester, and regulator, to experience the connotations of responsibility from different perspectives and to facilitate the transformation of values from external cognition to internal identification.

The realization of the dynamic coupling mechanism requires the support of diversified forms of teaching interaction to form a virtuous cycle in which cognitive processing and value experience mutually reinforce each other. In the experimental teaching segment, one can set up scenarios with anomalous data to guide students in appreciating the scientific attitude of seeking truth from facts during the process of analyzing error sources. In the case teaching segment, one can select industry cases with typical value conflicts and use debate-style discussions to prompt students to deepen their understanding of value principles through the clash of viewpoints. In the project-based learning segment, one can guide students to conduct inquiries into real industry issues, completing the internalization and integration of professional values while solving practical problems. This teaching interaction design, which embeds value experience into cognitive activities, can transform value elements from external attachments to knowledge into learners' internal qualities, thereby achieving a deep integration of professional knowledge learning and value character cultivation.

Conclusion

Starting from the disciplinary characteristics of the Food Quality and Safety major, this study systematically explores the mining and integration paths of ideological and political elements within the curriculum. At the level of connotative characteristics, this study reveals the symbiosis between professional knowledge and value connotations, the isomorphism between core competencies and educational elements, and the essential requirement of professional adaptability in the integration process, thereby clarifying the internal logic of the construction of ideological and political education within the curriculum for this major. At the level of mining strategies, this study constructs three types of methods: identification of implicit value factors based on curriculum knowledge modules, extraction of the spiritual lineage based on the discipline's development history, and dimensions of value analysis based on professional norms and ethical dilemmas, thus forming a systematic path for extracting value elements from three dimensions: knowledge ontology, disciplinary evolution, and industry contexts. At the level of integration paths, this study establishes a trinity implementation framework consisting of bidirectional integration of cognition and value in the curriculum objective system, structured design of value presentation in teaching content organization, and dynamic coupling mechanism of value internalization in teaching process interaction, thereby achieving a full-process connection of value elements from identification, organization, to internalization.

Future research can be further expanded in the following directions. First, one can further refine the differentiated integration models for different types of courses (such as theoretical courses, laboratory courses, and internship courses) to enhance the operability and specificity of the paths. Second, one can explore the evaluation indicator system and assessment methods for integration effectiveness to provide evidence-based support for teaching improvement. Third, one can pay attention to new value issues derived from emerging technology fields (such as foodomics, intelligent traceability, and alternative proteins) to continuously enrich the connotation and extension of ideological and political elements within the curriculum. Through sustained theoretical construction and teaching exploration, the overall quality of talent cultivation in the Food Quality and Safety major can be improved.

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