

# Research on Curriculum Reform of Integration Local Characteristic Resources under the Background of Emerging Engineering Education

-- Taking the course "Principles of Food Technology" as an example

Xi Li<sup>1</sup>, Chengxi Su<sup>2</sup>, Ling Li<sup>3</sup>, Chunying Peng<sup>3</sup>, Zhuqing Fan<sup>2, \*</sup>

<sup>1</sup> Academic Affairs Office of Pu'er University, Puer, China

<sup>2</sup> College of Biology and Chemistry, Pu'er University, Puer, China

<sup>3</sup> College of Tea and Coffee, Pu'er university, Puer, China

\*Corresponding author's email address: 1035130664@qq.com

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**Abstract:** Under the background of emerging engineering education, the curriculum reform of local universities attaches importance to training talents to serve local development. The teaching team organically integrates local characteristic resources into the teaching reform of the "Principles of Food Technology" course, carries out teaching content reconstruction, teaching mode innovation, and the construction of a double innovation community. With the construction of the curriculum system of "Learning is promoted by teaching, scientific research and practice, and industrial development is advanced by optimizing food technology through innovative thinking" as the core, the teaching team cultivates students' ability to analyze and solve practical problems and innovative thinking, improves the compatibility of curriculum objectives, and improves the quality of talent training. Cultivate high-quality applied talents to meet the needs of local industries.

**Keywords:** Principles of Food Technology, Curriculum Reform, Local Characteristic Resources, Serve Local Development.

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## 1. Introduction

The construction of "New Engineering" was initiated by the Ministry of Education in 2017 to address the new round of technological revolution and industrial transformation. It aims to introduce new ideas and elements into traditional engineering disciplines, emphasizing interdisciplinary integration, exploring innovative application-oriented talent cultivation models, supporting regional economic development and industrial upgrading, and adapting to social and economic development as well as the transformation and development of knowledge models[1,2]. As a pillar industry of the national economy, the food industry has an urgent need for technological innovation and industrial transformation. The core of its development lies in cultivating talents for food safety and process innovation technology. The Food Quality and Safety program is dedicated to nurturing high-quality applied talents for the food industry. Under the background of New Engineering construction, this program shoulders the social responsibility of providing applied technical talents and innovative food processes to support local food industry development[3,4].

The course "Principles of Food Technology" is a core professional course for the Food Quality and Safety major, characterized by strong interdisciplinary integration and prominent innovative application. It aims to enhance students' engineering awareness, innovation capabilities, and the ability to apply theory to practice in developing innovative processes [5]. Currently, research on the "Principles of Food Technology" course focuses primarily on teaching model reforms, exploring ideological and political elements within the curriculum, and collaborative course development between schools and enterprises. Emphasis is placed on cultivating students' practical skills and innovative abilities,

with content often incorporating large-scale modern and automated production processes to meet the rapidly growing demands of the food industry. Pu'er University is located in Pu'er City, the only city along the Yangtze River Economic Belt that boasts a unique geographical advantage-connected to three countries by one city, five neighbors by one river, and three borders by one foot. The city has 26 permanent ethnic minorities, accounting for 61.2% of the total population, and most food businesses are small and micro-enterprises, whose products often feature ethnic or regional characteristics. Existing studies have limited guidance on cultivating technical talents to meet local food industry development needs and have conducted fewer explorations into food technology for small and micro-enterprises with ethnic characteristics and economic applicability. The course team has conducted research to organically integrate local characteristic resources into the construction of the "Principles of Food Technology" course, aiming to develop food technology that aligns with regional productivity development features, cultivate high-quality applied talents to meet local industrial needs, and support the stability of ethnic specialty food enterprises.

## 2. The Significance of Integrating Local Characteristic Resources into the Curriculum Reform of "Principles of Food Technology"

### 2.1. The Course Content Construction Meets the Needs of Local Food Industry Development

"Principles of Food Technology" is an applied course that emphasizes engineering education, stresses the study of

theoretical knowledge to guide production practices, and promotes local industrial development. The course content includes principles of food processing and storage, interdisciplinary approaches to ensure food production safety, systematic learning and mastery of basic principles and methods for food preservation and processing, and the ability to correctly apply these principles to analyze and solve practical problems in food processing. As the importance of the food industry in the national pillar economy continues to rise, the teaching focus of "Principles of Food Technology" leans towards large-scale enterprises and modern production processes and storage, aiming to cultivate students' capabilities to adapt to large-scale production process development and innovation. However, it provides less guidance for small-scale enterprise production lines and specialty process development. The course team conducts research and integrates local specialty foods and food enterprise resources, refining distinctive processing techniques, and organically incorporates the principles and innovative development ideas of food technology with ethnic characteristics and economic applicability into teaching content, guiding students to possess a knowledge system and practical innovation capabilities that meet the needs of local food industry development.

## **2.2. Highlight the Characteristics of "National Gate University" Curriculum Construction in Pu'er University**

As the industrial structure transforms, technological innovation patterns evolve, and international influence grows, new-quality productive forces, with technological innovation at their core competitiveness, have gradually become a significant force in industrial development, posing new demands on talent. Pu'er University, as a "Gateway University" located in a border region inhabited by ethnic minorities, shoulders the national responsibility of fostering friendly, secure, and prosperous relations with neighboring countries. Internally, it has the special mission of stabilizing and enriching the border areas. The university is committed to being rooted in Pu'er, serving Yunnan, facing the nation, and radiating to South Asia and Southeast Asia. It serves the integrated development of local education chains, innovation chains, talent chains, and industrial chains, becoming a base for cultivating high-quality applied talents that meet the needs of new-quality productive forces in the region [6,7], with its

own characteristics compared to undergraduate talent cultivation at other universities. By integrating local characteristic resources into "Principles of Food Technology," it highlights the regional, ethnic, and unique aspects of local processing techniques, reforming course design and teaching content to align with the actual conditions of border areas, effectively showcasing the distinctive features of "Gateway University" course construction.

## **2.3. Stimulate Students' Subjective Initiative in Learning**

"Principles of Food Technology" is a course with strong engineering attributes, involving interdisciplinary fields such as microbiology, physics, applied chemistry, nutrition, and engineering design. It places high demands on students' learning abilities, thinking skills, and overall competence, which can lead to low enthusiasm among some students. However, over 85% of the students in this major come from Yunnan Province, making them more familiar with local resources or industries. The teaching team integrates these distinctive resources into the course content, using various characteristic processing cases to explain the characteristics and principles of technology in an accessible manner. This approach addresses the shortage of teaching resources at local universities, enhances students' interest in learning, improves their ability to analyze and solve problems, guides them in developing new products, fosters innovative thinking and research capabilities, and stimulates their initiative in learning.

## **3. Integration of Local Characteristic Resources into the Curriculum Reform of "Principles of Food Technology"**

The teaching team is oriented towards meeting the needs of local industrial development, restructuring course content to integrate distinctive resources, exploring innovative teaching models and curriculum systems, emphasizing practical teaching, cultivating students' ability to analyze and solve real-world problems and foster their innovative thinking, enhancing the alignment with course objectives (Table 1), improving the quality of talent cultivation, and promoting both theory and practice in the reform of the "Principles of Food Technology" course.

**Table 1. Course objectives of "Principles of Food Technology"**

TRGCLS	Concrete content
Knowledge objective	<ol style="list-style-type: none"> <li>1. Systematically learn and master the basic principles and methods of food preservation and processing, and be able to correctly apply the principles of food processing technology to analyze and solve the main problems in food processing.</li> <li>2. Master the causes of food spoilage in the process of food production, circulation and sales and their control methods, and have an in-depth understanding of the influence of the properties of food raw materials on the processing process, especially the influence of some special ingredients on product quality.</li> <li>3. Clarify the basis for the selection of main process conditions and methods in food production, and further master the process theory and its application.</li> <li>4. Able to analyze the processing technology of local characteristic resources and the processing technology principles, methods and characteristics of local small and micro enterprises.</li> </ol>
Capacity objectives	<ol style="list-style-type: none"> <li>1. To cultivate students' ability to explore and solve problems, realize the rationalization, scientific and modernization of preservation, and basic skills of food processing.</li> <li>2. Provide people with nutritious, high-quality, diverse, convenient to eat and fully functional food.</li> <li>3. Students can have the ability to guide and serve production.</li> <li>4. To enable students to have the ability to discover and solve problems in design, scientific research, production and other practical work, promote the rapid development of food product development, and cultivate innovative application talents with "quick start and strong follow-up"</li> <li>5. Be able to innovate processing technology for local characteristic resources.</li> </ol>
Moral education goals	<ol style="list-style-type: none"> <li>1. Through theoretical and practical classroom learning, students have a more in-depth and systematic understanding of the storage principles, storage methods, pretreatment and processing technology of food raw materials, semi-finished products and finished products, so as to ensure the safety of food production and processing, as well as storage processes, and improve the quality of products.</li> <li>2. Guide students to strengthen their ideals and beliefs, cultivate patriotism, improve professional quality and sense of responsibility, and enhance the sense of competition and innovation spirit.</li> <li>3. Cultivate students to combine theory with practice, so that students can carry out scientific thinking independently and form critical thinking mode.</li> <li>4. Cultivate students' scientific spirit and the spirit of science and technology craftsmen in a big country to serve society and local economic development.</li> </ol>

## 4. Local Characteristic Resources are Integrated into the Theoretical Curriculum Reform of "Principles of Food Technology"

### 4.1. Integrate Local Characteristic Resources into the Design of Teaching Content to Meet the Development of Local Industries

This course on Food Technology systematically integrates theoretical knowledge with practical applications, leveraging Yunnan's rich agricultural resources and regional cultural heritage to foster both technical proficiency and ethical awareness. The curriculum begins with an introduction to food processing concepts, industrial development trends, and the scope of food technology, illustrated by the challenges and prospects of Pu'er tea and coffee industries, which highlight the importance of technological innovation for value enhancement and environmental sustainability. Moving to dehydration processing, students explore principles of drying and its impact on food quality through case studies of traditional Yunnan snacks like Baihua Yangtibing (a pastry) and coffee roasting techniques. This section emphasizes dialectical thinking by analyzing the constant and falling rate drying stages of Baihua Yangtibing while linking wild mushroom dehydration to rural revitalization efforts, cultivating social responsibility.

In the heat treatment and sterilization module, students learn about canning technologies through locally inspired products such as Bajiao flower (plantain flower) braised pork and vacuum-packed ethnic snacks. Historical anecdotes, including the creative use of canned foods during the Laoshan Campaign and Premier Zhou Enlai's preference for preserved peaches, are woven into the curriculum to instill patriotism

and align personal aspirations with national development. The freezing preservation chapter delves into cold chain logistics and frozen ethnic foods like Sanjiangjiao Baba (a glutinous rice cake), emphasizing the strategic role of cold chain infrastructure in supporting the Belt and Road Initiative and stimulating innovation in traditional food culture.

The fermentation and smoking preservation section focuses on indigenous practices such as Suancai (fermented vegetables) and smoked jerky, encouraging students to address gaps in local preserved food development while raising awareness about health impacts and food safety. Finally, the radiation preservation module introduces cutting-edge applications like irradiated Mujiangzi (litsea cubeba)-flavored chicken feet, inspiring scientific curiosity and innovation in leveraging regional resources. Throughout the course, ideological and political education is seamlessly integrated, cultivating professional responsibility, a scientific outlook on development, patriotic sentiments, and an innovation-driven mindset, thereby preparing students to contribute to sustainable food industry growth with cultural confidence and ethical integrity.

### 4.2. Characteristic Resources Drive the Reform of Teaching Mode, and Construct a Curriculum System of "Learning, Research, Practice and Promotion, Innovation and Thinking, and Promotion of Production"

The teaching team conducts research on the local food industry and the development of characteristic food resources, focusing on industrial needs and local resource development processes. The curriculum is designed with the aim of improving characteristic processing techniques and enhancing students' abilities. Before class, students are

required to use online and offline resources to investigate and learn about the application of these processes, designing new products based on group tasks. During class, the focus is on creating scenarios using characteristic processes, guiding students in mechanism analysis and parameter control deconstruction, exploring the impact of processes on food quality and their preservation principles, and discussing process applications and optimizing new product designs. After class, students complete the design and processing of products through practical course activities, innovate product processes, and participate in academic competitions, reinforcing their theoretical knowledge system and practical skills, while training innovative thinking and research capabilities. At the same time, the focus is on applying processes suitable for local food industry development, introducing cutting-edge technologies to lead students to continuously improve existing processes, overcome technical bottlenecks in small enterprises and local characteristic resource development, achieve technology transfer, and align with the goal of cultivating talents that meet local industrial demands. By promoting multiple methods such as learning theoretical knowledge, researching frontier technologies, and developing new products through process practice, the teaching team aims to enhance students' learning abilities and improve course quality. Through innovative methods and approaches to process application, reflecting on the limitations of current process development and optimizing process technology to break through the bottleneck of industrialization of characteristic resources, the course promotes the development of local specialty foods in various ways, achieving innovation and reform in the teaching system.

## 5. Local Characteristic Resources are Integrated into Curriculum Reform and Educational Achievements

The curriculum reform, which integrates local characteristic resources, has achieved certain educational outcomes in supplying applied technical talents for the development of local food industry and providing innovative food processes. In 2024, 60.56% of students' graduation papers explored directions related to local characteristic resources, with 3 national-level student innovation and entrepreneurship projects approved and multiple provincial-level projects, promoting the innovation of food processes using local characteristic resources. Comprehensive quality has improved, the quality of talent cultivation has been enhanced, and English proficiency has steadily increased, with the pass rate for the College English Test Band 4 rising from 16.13% to 28.75%. The postgraduate admission rate remains above 10%, and the certification rate for skills such as barista has reached 6%. Two provincial second prizes were won in the National College Students' Life Science Competition, one national excellent award was received in the China Barista Team Championship, one silver medal and multiple bronze medals were awarded in the Internet+ College Students' Innovation and Entrepreneurship

Competition, and many individuals have taken root at the grassroots level to serve local development, earning high recognition from employers.

## 6. Conclusion

The course "Principles of Food Technology" is designed under the new engineering education framework, aiming to meet the needs of local industrial development. It focuses on cultivating students' ability to analyze and solve practical problems and fostering innovative thinking. The course content has been restructured to integrate distinctive resources, driving educational reform. It constructs a curriculum system that emphasizes "learning through research, practice promoting learning, innovation inspiring excellence, and production advancing excellence." By integrating the construction of innovation and entrepreneurship communities, it promotes school-enterprise cooperation for mutual benefit, continuously exploring technical talent cultivation models that meet local industry demands.

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