

## PROCEEDINGS ARTICLE

# Research on the Teaching Reform and Ideological and Political Construction of the "Technological Economics" Course for Business Administration

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## ABSTRACT

As a compulsory course for business administration majors in many colleges and universities in China, "Technological Economics" focuses on improving students' technical and economic analysis and decision-making thinking ability. The existing teaching reform of "Technological Economics" courses has focused on deepening the exploration of teaching models and teaching methods, and has not yet formed a relatively mature course ideological and political teaching content system. How to strengthen the ideological and political construction of "Technological Economics" courses and fully integrate the content of course ideological construction into course teaching is a key issue that needs to be solved urgently in the current course teaching reform. To this end, from the aspects of teaching content, teaching objectives, teaching methods, course ideological goals and elements, and teaching materials construction, the author will clarify the direction of course teaching reform and carry out research and discussion on course ideological and political construction.

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## 1. INTRODUCTION

As a required course for business administration majors in many colleges and universities in China, "Technological Economics" is the basic theory and method that business administration undergraduates must master, and the basis for learning subsequent professional courses. "Technological Economics" is a comprehensive emerging discipline formed by the intersection of technical science and economic science. It is a discipline that studies the relationship between technology and economy. It seeks the best combination of technology and economy through technology selection, economic analysis and effect evaluation, and determines the best scheme of advanced technology and reasonable economy. Through the study of this course, students can master basic theories and methods of analysis, calculation, demonstration and evaluation of economic benefits of technical solutions on the basis of understanding the interrelationship between technology and economy,

and select the optimal solution through multi-program comparison, in order to provide a scientific basis for the decision-making of investment projects. The course focuses on the development of holistic, pioneering and developmental thinking skills, investment decision-making skills, and analytical and problem-solving skills.

At present, the teaching reform of the "Technological Economics" course of the business administration major mainly focuses on the teaching mode and teaching methods. For example, Guo Yuanyuan et al. [1] proposed that interest cultivation has a significant effect on the teaching effect of the course, which can be achieved by using real events, highlighting the status of cases, using multimedia means and optimizing assessment models. Bao Yibei et al. [2] highlighted the implementation of the PBL-based teaching model and problem-based inquiry-based learning and case-based discussion teaching in order to mobilize students' enthusiasm for learning and

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improve classroom effectiveness. Ju Xiaoyu et al. [3] made full use of the geographical advantages of the campus located in the petroleum and petrochemical industry base to optimize the teaching content of the course, and used the joint teaching of scenarios and cases, the seminar-style PBL teaching mode to improve teaching methods and improve the assessment mechanism.

Zhang Ke et al. [4] put forward improvement measures from three aspects: course teaching content, teaching methods and assessment methods. Li Yanfang et al. [5] proposed the reform process of revising the syllabus, building teaching resources, designing the whole teaching process, and obtaining feedback on teaching effects; She also proposed to build a teaching platform integrating flipped classroom, case discussion and project practice, reform the way of course examination, and establish a combination of video learning + case assessment + project assessment + structure block diagram sorting + final examination and other assessment methods. Zhan Song et al. [6] put forward strategies such as implementing "refined" teaching, increasing learning interactions, enriching the teaching evaluation system, and combining theory and practice.

Ma Li et al. [7] proposed to carry out teaching method reform research from seven aspects: taking the first lesson, selecting supporting tutoring materials, strengthening exercise training, adopting case teaching methods, combining online teaching with flipped classrooms, adding large homework links, and setting up group discussions. Yan Bo [8] systematically analyzed the current situation of the integration and development of information technology and traditional classrooms, and proposed specific measures for integration and reform between the two. Liu Xiaoyan et al. [9] implemented the OBE education concept and proposed reform measures from aspects of teaching content, teaching methods, assessment methods, and teacher team construction.

Li Ying et al. [10] proposed a hybrid online and offline teaching model and task-oriented teaching methods. Lv Haiping et al. [11] constructed and piloted "five-in-one" course teaching reform content that is conducive to improvement of innovation and entrepreneurship ability based on the reorganization of course teaching content, supported by aggregating diversified course teaching resources, guaranteed by implementation of participatory teaching methods, consolidated by practicing extracurricular practical teaching, and testing by the whole process of course assessment.

In addition, some college teachers actively carry out exploration and research on the reform of course

ideology and integration into "Technological Economics" course and promote the construction of course teaching materials. For example, Yang Fulin et al. [12] based on the concept of "thinking about politics in a big way", ran political education through the whole process of Technological Economics course, deeply excavated and refine the ideological elements contained in the knowledge system, found the integration point between professional knowledge and political thinking, and carried out the teaching reform and innovation of "course thinking". Xu Jing et al. [13] took the content of nominal interest rate and real interest rate as an example to explain how to explore the ideological and political elements of the course and achieve the basic goals of strengthening moral education and cultivating people. Chen Shu et al. [14], based on the concept of continuous improvement, proposed strategies such as strengthening ideological and political education, changing teaching concepts, reforming teaching methods, updating teaching contents, and improving the assessment mechanism. Wang Shilei et al. [15] proposed targeted measures for specific teaching reform from four aspects: talent training goal orientation, course teaching orientation, management goal orientation, and teaching evaluation orientation.

Through literature review and course teaching and research, it is found that a relatively mature content system of ideological and political education has not been formed in the course of "Technological Economics" offered by the business administration major in domestic colleges and universities. How to clarify the direction of the course teaching reform and strengthen the ideological and political construction of the "Technological Economics" course of business administration is the key problem to be solved in the course teaching reform.

## 2. TEACHING CONTENT SYSTEM DESIGN

The teaching content system design of the "Technological Economics" course mainly includes the teaching modules of Technological Economics overview, Technological Economics principles, technology forecasting and technology evaluation, capital equivalence method of technical economic analysis, decision-making method of technical economic analysis, project feasibility study method, technical and economic analysis method of equipment update, value engineering and so on. The core content of each teaching module is shown in Table 1.

Course Modules		Core Content
An overview of the Technological Economics	Definition of the discipline of Technological Economics	Concepts of Technological Economics; the emergence and development of the Technological Economics
	The disciplinary system of Technological Economics	Research objects and tasks of Technological Economics; research content and methods of Technological Economics
	The disciplinary characteristics of Technological Economics	The characteristics and role of the discipline of Technological Economics; the nature and relevance of the discipline of Technological Economics
Principles of Technological Economics	The law of the role of techno-economic analysis	The law of technological and economic development; the law of interaction between technology and economy
	Principles and procedures of techno-economic analysis	Principles of techno-economic analysis; procedures for techno-economic analysis
	The economic effects of techno-economic analysis	The concept of techno-economic effects; indicators of technical economy effect
Technology prediction and technology evaluation	Technology forecast overview	The concept and type of technical forecasting; procedures and methods for technical forecasting
	Three types of technical forecasting methods	Intuitive prediction method, causal prediction method, trend prediction method
	Overview of technical evaluations	The concept and content of technical evaluation; procedures and methods of technical evaluation; technology asset appraisal
The method of capital equivalence for techno-economic analysis	An overview of the time value of funds	Definition of the time value of funds; a measure of the time value of funds
	Cash flow is equivalent to capital	Cash flow and cash flow chart; equivalent funds
	Three types of capital equivalence methods	The one-time payment type of the equivalent of funds; the equivalence method of funds of the equal amount payment type; the method of equivalence of funds for the equal difference payment type
Decision-making methods for techno-economic analysis	Three types of decision analysis methods	Time-based decision analysis methods; value-based decision analysis methods; efficiency-based decision analysis methods
	Multi-scenario decision analysis methods	Decision-making analysis methods for independent programs; decision analysis methods for mutually exclusive schemes; decision analysis methods for hybrid scenarios
	Uncertainty and risky decision-making methods	Overview of uncertainty and risky decision-making; break-even analysis; sensitivity analysis
Project feasibility study methodology	Overview of the project feasibility study	The concept of project feasibility studies; origin and development of project feasibility studies; the role and purpose of the project feasibility study
	Stages and procedures of the project feasibility study	Stages and steps of the project feasibility study; the content and procedures of the project feasibility study
	Economic evaluation of project feasibility studies	Content and procedures, indicators and basic statements of financial evaluation; the procedures and steps, indicators and basic statements of national economic evaluation, and the relationship between financial evaluation and national economic evaluation

Course Modules		Core Content
Techno-economic analysis methods for equipment updates	Equipment wear	Forms of equipment wear; equipment wear forms and compensation methods
	Equipment depreciation	Overview of equipment depreciation; the device depreciation method
	The decision-making method for device updates	Overview of device update decisions; decision-making methods for equipment prototype updates; decision-making methods for new equipment updates; a comprehensive comparison of device update scenarios
Value engineering	Principles of value engineering	The origin and development of value engineering; concepts of value engineering; the characteristics and role of value engineering
	Working procedures and methods of value engineering	Working procedures for value engineering; object selection and intelligence gathering; functional analysis
	Creation and implementation of programs	Program creation; program evaluation; experimental research and proposal approval of the proposal; evaluation of the results of value engineering activities

**Table 1.** Core content of the "Technological Economics" course.

### 3. DESIGN OF TEACHING OBJECTIVES

Through teaching this course, the teaching objectives that need to be achieved mainly include five parts: knowledge objectives, skill objectives, method objectives, ability objectives and value objectives.

#### 3.1. Knowledge Objectives

The knowledge objectives of this course mainly include: to enable students to master the basic concepts, basic knowledge and basic theories of Technological Economics; to make students understand how techno-economics can help companies conduct technical feasibility and economic rationality analysis; to make students understand the main contents and methods of Technological Economics; to enable students master the interaction between technology and economy, technology prediction methods, technology evaluation methods, capital time value, economic evaluation methods, feasibility study theory, uncertainty analysis methods, equipment update decision-making methods, value engineering theories and other knowledge content and theories; to let students master the concepts of technology forecasting, technical evaluation, project feasibility study, value engineering and so on.

#### 3.2. Skill Objectives

The skill objectives of this course mainly include: to let students have the essential skills such as analyzing

the laws of interaction between technology and economics, using static economic evaluation methods to measure the static economic evaluation indicators of projects, using the dynamic economic evaluation method to calculate the dynamic economic evaluation indicators of the project, preparing project financial statements using the general methodology of project feasibility studies, using the general method of uncertainty analysis to perform project break-even analysis and sensitivity analysis, adopting the general method of equipment update decision-making to perform the analysis of new and old equipment update decision, using the general method of value engineering analysis to conduct the minimum life cycle cost function analysis, etc.

#### 3.3. Method Objectives

The method objectives of this course mainly include: to enable students to use methods and tools such as the payback method, the investment return method, the net present value method, the net annuity method, the internal rate of return method, the present value of expenses method, the annual cost method, the breakeven analysis, the sensitivity analysis method, the average operating cost method, and the value engineering analysis method.

#### 3.4. Ability Objectives

The ability objectives of this course mainly include: to let students form information analysis ability, data

analysis ability, investment decision-making ability, feasibility study ability, risk analysis ability, equipment management ability, value engineering analysis ability and other abilities; and to enable students to have the ability to engage in system thinking, innovative thinking and analytical thinking required to engage in technical and economic analysis activities, and be able to explore new solutions based on complex and changeable business scenarios.

### 3.5. Value Objectives

The value objectives of this course mainly include: to let students deeply understand the importance of technical and economic analysis in the process of building socialism with Chinese characteristics, and strengthen self-confidence in the path of socialism with Chinese characteristics, theoretical self-confidence, institutional self-confidence, and cultural self-confidence; to cultivate students to practice the core values of socialism and consciously integrate the technical and economic analysis of enterprises into the development of the country; to cultivate students to carry forward the national spirit with patriotism as the core and the spirit of the times with reform and innovation as the core, and deeply understand the ideological essence and practical innovation of enterprise technology prediction, technical evaluation, project feasibility study, equipment management, value engineering and other aspects in traditional Chinese culture and Chinese local enterprises; to cultivate students to firmly establish the concept of the rule of law, strictly abide by the relevant laws in the technical and economic analysis activities of enterprises, and be good at using the rule of law thinking and rule of law methods to safeguard the interests of enterprises and the country; to cultivate students to establish a correct sense of entrepreneurship and social responsibility, and consciously cultivate professional character and behavior habits of abiding by discipline and law, loving their posts and dedicating themselves to their work, selfless dedication, honesty, trustworthiness, doing things fairly, pioneering and innovating.

## 4. REFORM OF TEACHING METHODS

The teaching of this course uses multimedia teaching methods, focusing on the integration of lectures (classroom teaching), checking (students consulting materials), doing (social practice, research), performing (student speeches, reports) and discussing (papers, discussions), and the teaching methods adopted mainly include blended teaching methods, theoretical teaching methods, case teaching

methods, interactive teaching methods and multimedia teaching methods.

### 4.1. Blended Teaching Method

This method will take theory teaching as the main line and consolidate the theoretical foundation; With the focus on the cultivation of thinking ability and humanistic spirit, teachers will train students to inherit the excellent traditional culture of the Chinese nation and practice the core values of socialism. Teachers use case teaching and multimedia teaching as a means to cultivate interest in learning. They need to adhere to the teaching idea of "teaching them to fish and teaching them to fish", guide students from passive listeners and recipients to active thinkers and explorers, and cultivate students to carry forward the spirit of craftsmanship of dedication and dedication.

### 4.2. Theoretical Teaching Method

In the design and organization of the course content, this method can reflect the theoretical, systematic and cutting-edge nature of Technological Economics, clarify the knowledge framework system of Technological Economics, and highlight the key points. Teachers should equip business administration students with the necessary knowledge of economic management and practical technical and economic analysis skills, and lay a good foundation for students to better learn other relevant professional courses; at the same time, in the teaching, they need to guide the students' moral character to develop in a correct and healthy direction, and carry out the correct technical and economic evaluation methods and programs for industrial and commercial enterprise management.

### 4.3. Case Teaching Method

Case teaching is an indispensable and important part of Technological Economics teaching, the purpose is to enhance the practicality and application of Technological Economics knowledge system, and enhance students' ability to use the basic theories of Technological Economics to analyze practical problems. This course adopts the combination of theoretical teaching and case analysis, organizes classroom case analysis and practice homework, combines theory with practice, combines qualitative and quantitative analysis, correctly uses management, modern economics, statistics and other methods, uses a systematic point of view to study technical and economic problems in enterprise management, and avoids only focusing on the explanation and explanation of theories and methods, while ignoring

the solution of practical problems, in order to further cultivate students' technical method application and design ability and team spirit.

#### **4.4. Interactive Teaching Method**

In order to make students have a deep impression of Technological Economics knowledge, this course changes the traditional passive way of teachers speaking and students listening, combined with the teaching method of doing classroom exercises while speaking, and interactive communication between teachers and students. Students are required to fully grasp the basic concepts, basic principles and basic methods of technological economy, and be able to use the basic principles, methods and skills of technological economy to study, analyze and evaluate various management practice activities in order to obtain satisfactory solutions for economic benefits, provide scientific basis for decision-making, cultivate students' ability to analyze and solve practical technical and economic problems, and the scientific spirit, systematic thinking and dialectical thinking.

#### **4.5. Multimedia Teaching Method**

Multimedia teaching methods are used to increase the classroom demonstration link and enhance the vividness of the course. This method can help to cultivate students' economic concepts, correct "three views", money concepts, financial management concepts and reasonable consumption concepts; it can also help to cultivate students' scientific spirit, craftsman spirit, thrifty and thrifty spirit, and cultivate students' logical thinking, legal thinking, bottom-line thinking and critical thinking skills. Also, it will enhance students' sense of responsibility and mission as socialist patriotic youth, enhance their sense of identity with the implementation of the socialist system and national economic policies, help establish students' national self-esteem and pride, and enhance students' cohesion and centripetal force.

### **5. OBJECTIVES AND ELEMENTS OF IDEOLOGICAL AND POLITICAL EDUCATION**

In accordance with the "Guidelines for Ideological and Political Construction of University Courses" and in combination with the core teaching content and teaching objectives of this course, it is necessary to firmly establish the central position of business management professional training, and take the responsibility of educating people in the "Technological Economics" course.

#### **5.1. Education Goal of Ideology and Politics in Courses**

The "Technological Economics" course mainly achieves the following four aspects of the course ideological goals.

##### **5.1.1. Theory Confidence**

The goal is to enable business administration students to acquire the necessary Technological Economics knowledge and practical technical and economic analysis skills, and to lay a good foundation for students to better study other relevant professional courses; At the same time, in the teaching, teachers should guide students' moral character to develop in a correct and healthy direction, have the basic ability of enterprise technical and economic analysis and project feasibility study, conduct correct technical and economic analysis and evaluation of business enterprise management, and provide a scientific basis for decision-making.

##### **5.1.2. Road Confidence**

It is necessary to guide students to deeply understand the key role of technological economy in promoting the various undertakings of socialism with Chinese characteristics and the process of high-quality economic and social development. It is also necessary to integrate theory with practice, combine qualitative and quantitative analysis, correctly apply methods such as management, modern economics and statistics, use a systematic point of view to study technical and economic problems in enterprise management practice, and further cultivate students' ability to analyze and solve practical technical and economic problems, as well as the spirit of science, systematic thinking and dialectical thinking.

##### **5.1.3. Institutional Confidence**

When teaching limited resources, teachers need to emphasize General Secretary Xi's development concept of "green water and green mountains are golden mountains and silver mountains". When teaching resource allocation, teachers should take the major achievements of China's efficient coordination of social resources to fight the new crown epidemic as a case study, and guide students to understand and support China's anti-epidemic policy of protecting people's life safety and physical health at all costs. When teaching the economic system, teachers need to expound superiority of the socialist system, enhance students' sense of identity with the socialist system and the implementation of national economic policies, and enhance students' institutional self-confidence.

#### 5.1.4. Cultural Confidence

Through case teaching, it is a must to guide students to inherit the excellent traditional culture of the Chinese nation, practice the core values of socialism, and cultivate students' economic concepts, correct "three views", money concepts, financial management concepts and reasonable consumption concepts; there is also a must to cultivate students' scientific spirit, craftsman spirit, thrifty and thrifty spirit, cultivate students' logical thinking, legal thinking, bottom-line thinking and critical thinking skills, enhance students' sense of national pride and social responsibility, and strengthen students' sense of national honor and cultural confidence.

### 5.2. Education Elements of Ideology and Politics in Courses

#### 5.2.1. Value Education

When teaching Chinese information technology, teachers need to elaborate on the scarcity, allocation, and utilization of resources, as well as economic systems and opportunity costs. Under the leadership of the Communist Party of China, the state has used strong macroeconomic regulation and control and financial means to optimize allocation of resources, promote technological innovation, accelerate the rapid development of the national economy, maximize personal and social interests, and strengthen students' cultural and institutional self-confidence.

#### 5.2.2. Patriotic Education

Since the 18th National Congress, China has built many railways, such as the intelligent high-speed railway – Beijing-Zhangjiakou railway, the heavy-load railway – Haoji railway and other railways are the products of "transportation power, railway first", which highlights the strength of China's railway construction and also highlights China's comprehensive national strength. By telling students about the modernization and intellectualization of China's railways, it can stimulate students' national pride and patriotic enthusiasm, encourage students to study hard, and strive to become qualified successors and builders of socialism.

#### 5.2.3. Moral Education

During the teaching process, teachers will introduce Mao Yisheng, Yang Liandi, Wang Fenglian and other "information technology experts of the Republic", tell their heroic deeds, encourage students to learn the spirit of fearing difficulties, being brave to explore and overcome difficulties, strengthen students' moral

education, and further cultivate students' spirit of struggle, exploration and innovation.

#### 5.2.4. Science and Technology Education

Through the study of "Technological Economics" to develop history, it is necessary to enhance students' understanding of "science and technology is the primary productive force", and enhance the students' mission of the times through equipment renewal development prospects. It is also necessary to guide students to care about social development and hot scientific and technological issues, and establish a sense of responsibility and mission to study diligently and repay the society.

#### 5.2.5. Economic and Environmental Protection Education

Through the application of "technical and economic evaluation method", students will be familiar with the correct selection of economic evaluation indicators in the national economy, the objective science of enterprise technical and economic evaluation and the data structure characteristics of China's digital economic development. Through the risk method, it is of great importance to improve people's understanding of the harmonious coexistence between man and nature and environmental protection, strengthen students' education on ecological civilization awareness, inspire students' ecological civilization ideas, enhance students' awareness of environmental protection and ecological civilization concepts, and guide students to consider the feasibility analysis and decision-making of projects from the perspective of environmental and social impact.

## 6. REFORM OF TEACHING MATERIALS

The construction of teaching materials is an important guarantee for improving the teaching level of teachers' courses and students' learning ability. For the existing Chinese domestic "Technological Economics" course teaching materials include two categories, one is theory-oriented teaching materials, mainly theoretical knowledge teaching; the other is practice-oriented teaching materials, mainly case teaching. Through the teaching and research of the curriculum, it is found that similar teaching materials in China have not yet formed a relatively mature curriculum ideological and political teaching content system of the "Technological Economics" course. To this end, the main direction of the reform of curriculum teaching materials construction is to stimulate students' enthusiasm for learning as the

goal to promote the construction of teaching materials, to ensure high-quality teaching materials into the classroom.

The first is to deeply explore the ideological and political construction of the "Technological Economics" curriculum, improve the content system of the curriculum of ideological and political teaching, guide students to deeply understand the country's strategic thinking on scientific and technological innovation and economic development, and systematically carry out education on socialism with Chinese characteristics and the Chinese dream.

Second is to strengthen students' understanding and mastery of overall knowledge of the "Technological Economics" course, help students understand the scientific and technological innovation strategy and economic development strategy, scientific and technological innovation policy system and economic policy system in the field of business administration and industry, improve students' understanding of the importance of corporate social responsibility, and cultivate students' sense of social responsibility.

The third is to improve students' theoretical analysis ability and management practice ability, guide students to go deep into social practice, pay attention to real technical and economic issues, and cultivate students' ability to flexibly use the overall knowledge of the "Technological Economics" course for technical economic analysis and decision-making.

To this end, the construction of teaching materials should be based on the preparation of similar teaching materials, guided by Marxism-Leninism, Mao Zedong Thought, Deng Xiaoping Theory, the important thinking of "three represents", the scientific concept of development, and Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, to deeply explore the curriculum ideological and political teaching content system of the "Technological Economics" course, and form a fusion teaching material for the "Technological Economics" course with theories, methods and cases.

Through the research on the ideological and political construction of the curriculum with the main contents such as technical forecasting and technical evaluation methods, the capital equivalence method of technical economic analysis, the decision-making method of technical economic analysis, the feasibility study method of project feasibility study, the technical and economic analysis method of equipment update, and the value engineering, students can improve their technical and economic analysis decision-making thinking ability on the basis of learning the knowledge of the "Technological Economics" course.

## 7. CONCLUSION

The teaching reform of the "Technological Economics" course of the business administration major is a teaching practice issue, which involves the improvement and perfection of many links in teaching activities, and its core is to enhance students' technical and economic analysis and decision-making thinking, as well as practical application ability. The essence of the teaching reform of the "Technological Economics" curriculum is to improve the teaching effectiveness of teachers in the cultivation of talents in applied colleges and universities, the first is to teach with morality, that is, in the limited teaching time, the excavated and selected case resources should be enough to infect students and touch the soul of the scientific principles and life philosophy, and lead students to ideals and beliefs, value orientation, political beliefs and social responsibilities. The second is to teach with virtue, that is, to tell the exemplary deeds of statisticians in combination with professional knowledge, and to stimulate students' patriotic feelings, dedication, sense of responsibility and sense of mission like spring wind and rain. The third is to teach with enjoyment, that is, to make full use of information-based teaching methods, select case videos that are closely related to current events, and cleverly design interactive discussion sessions in class, subtly impart professional knowledge in a fascinating way, and carry out ideological and political education for students, giving full play to the synergy effect of the curriculum. As a strategic reserve talent for national development and enterprise management, business administration students must not only master the overall knowledge of Technological Economics, but also have the practical application ability of technical economic analysis. Therefore, the teaching reform of the "Technological Economics" course must actively explore and boldly practice from the aspects of teaching content, teaching objectives, teaching methods, ideological and political goals and elements in courses, and textbook construction, and develop a comprehensive platform suitable for the combination of theoretical teaching and experimental simulation teaching of this course.

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