Connotations and Methods of Sustainable Development in Higher Education

Peng-Jung Lin*, Guo-Liang Dai, Min-Min Jiang, Zhen-Hang Nong

Nanfang College Guangzhou, Guangzhou, 510970, China
*Corresponding author: linpengjung@163.com

Abstract: *In the past, higher education emphasized examinations, focusing on memorization and rote learning, with teaching methods primarily being lecture-based; currently, higher education focuses on the integration of learning and application, where what learners acquire is applied to local economic and social development, and the integration of industry and education is crucial for the sustainable development of higher education, representing a mindset of sustainable development. This paper explains the connotation of sustainable development in higher education and methods to achieve sustainable development, promoting higher education to be more aligned with the environment, society, and local development. This study employs the extended case study method and comparative method to collect student data, which helps integrate and expand existing theories and apply them in actual teaching processes. The study finds that after adopting new practical teaching methods, higher education students can better apply the theories they have learned to analyze enterprise practices, meeting the needs of local industrial development. Compared to the one-way traditional teaching method, the introduction of two-way approaches such as problem-based learning, action learning, and teaching scenarios more effectively facilitates the integration of learning and application, the integration of industry and education, and the alignment with local economic and social development, thereby more systematically promoting the sustainable and enduring development of higher education and providing new perspectives for subsequent research to extend connections to different colleges and local industries.*

Key Words: *Sustainable Development; Teaching Methods; Teaching Strategies; Teaching Scenarios*

Introduction

With the progression and transformation of the era, higher education has shifted from its previous emphasis on examinations, memorization, and rote learning to focusing on the integration of learning and application. What learners acquire is now directed toward local economic and social development. The integration of industry and education is crucial for the sustainable development of higher education, representing a sustainable mindset that has become a significant topic of interest in both academic and practical fields.

Conducting in-depth research on this topic holds substantial theoretical value and practical significance. It not only helps clarify the connotations of sustainable development in higher education and the methods to achieve it but also provides new, practical, and enduring teaching approaches for higher education institutions to respond to changes in the current educational environment and plan for future development.

1. The Origins of Sustainable Development in Higher Education

The focus on education that integrates people with their environment and local economic and social contexts is not a recent phenomenon. In recent years, emphasizing the integration of local environments and enterprises into the educational system has become a trend. Whether through emerging sustainable research directions in higher education institutions or the concept of sustainability education in basic education abroad, these developments mark a new stage in combining theory and practice for local economic and social development. At the international level, Education for Sustainable Development has been promoted by UNESCO as a new direction for the future of education.

Education for Sustainable Development (ESD) is an educational approach emerging in the era of sustainable development. Its goal is to help learners develop the scientific knowledge, learning abilities, values, and lifestyles necessary for sustainable development, thereby promoting sustainable development in society, economy, environment, and culture [3].

Within the higher education system, leading institutions are also committed to advancing Education for Sustainable Development. For example, as early as 2016, Tongji University in China established a "Sustainable Development Minor Program" and jointly offers a "Creative Sustainability" master❼ degree with Aalto University in Europe, further strengthening international cooperation in sustainable education.

2. Basic Theories

2.1 Teaching Methods

Problem-Based Learning (PBL) consists of four components: problems, outputs, students, and teachers. Teachers inspire students to discover and solve problems (outputs). Students are the main actors, and they ultimately propose a specific and feasible solution. The implementation process is as follows: teachers explain the connotation of theoretical knowledge; student groups discuss the specific facts (what) of the theory and how to practice it; the output result is the solution, which is also the teaching outcome; finally, the solution is evaluated through a 360-degree assessment by teachers, students, and teaching assistants [1].

Action Learning (AL) involves learning knowledge, sharing experiences, creatively solving problems, and taking actual actions. Every three to four students form a learning group. They address the proposed problems by pooling their wisdom and efforts, sharing knowledge and experiences. Finally, the students propose solutions to the problems, thereby acquiring knowledge and experiences [2].

2.2 Teaching Strategies

The teaching approach adopts the "Learning, Thinking, Expressing, Applying, and Transforming" model[4] for integrating learning and application, which involves learning theories, thinking about theories, expressing theories using the 5W1H method, applying theories in combination with enterprise practices, and transforming them into various forms of outcomes. This enables postgraduates to apply the learned theories to life and work, turning what they have learned into practical use, achieving the integration of learning and application, and immediately applying what they have learned, thereby verifying whether the theories are feasible, usable, developable, and capable of breakthrough.

3. Qualitative and Quantitative Research Methods

Employing diverse methods to collect various types of data helps mitigate the biases and limitations of a single research approach, thereby contributing to more comprehensive information gathering.

3.1 Extended Case Study Method

This research employs the extended case method [5] from qualitative research, supplemented by observations, focus interviews, and the collection of practical literature. This methodological approach uses empirical data gathered through case study to reconceptualize and extend theory, and aims not to construct new theories but to integrate and extend existing ones. By comparing theories with interview data and further contrasting concepts with theories, the iterative exchange and intensive analysis of these two cycles enhance the interpretation of the data.

3.2 Comparative Analysis

This study observes undergraduate students in Logistics Management from the class of 2022 and collects data to conduct a comparative analysis of traditional didactic teaching methods and new practical teaching methods. Before the conclusion of the course, teaching assessments are conducted to evaluate the effectiveness of the first phase (Weeks 1-8), which employed traditional didactic teaching methods, and the second phase (Weeks 9-16), which implemented new practical teaching methods. A

comparative study is carried out to explore the differences and outcomes of these distinct teaching approaches.

4. Teaching Methods in Traditional Higher Education

The teacher-centered knowledge transmission model still dominates higher education. This model emphasizes the one-way transfer of knowledge and standardized assessment, creating a significant gap with the current diverse and individualized needs of learners. The advent of the digital era has altered the channels and methods of knowledge acquisition, leading students to demand greater autonomy, interaction, and practicality in the learning process. The traditional classroom teaching model struggles to meet these emerging demands, resulting in a structural imbalance between educational supply and learning needs. This imbalance is particularly pronounced in the rapidly evolving knowledge society.

The traditional lecture-based method, known as Lecture-based Learning (LBL), is a one-way teaching approach where teachers deliver knowledge and students passively receive it. This method is ill-suited to the rapidly changing global environment and the pace of knowledge evolution. There is an urgent need for higher education institutions to explore systematic sustainable development strategies that can maintain their enduring vitality and innovative capacity.

Teaching encompasses the teaching system, the learning system, and the teaching scenarios. The teaching system includes the teacher's characteristics, what the teacher teaches (the theoretical knowledge system of 5W1H), and how they teach (teaching methods, teaching strategies). How these systemic elements integrate with the learning system and connect with learners requires teaching scenarios. The learning system includes the learner's characteristics (age, gender, grade, cognition, attitudes, and behaviors), what they learn (the theoretical knowledge system of 5W1H), and how they learn (learning by doing, doing while learning, learning and doing simultaneously, enterprise practice of 5W1H). How these systemic elements integrate with the teaching system and connect with educators requires teaching scenarios.

The traditional lecture-based method is a one-way teaching model that lacks responses, feedback, and discussions from the learning system. Without bidirectional communication between the teaching and learning systems, and without teaching scenarios that support learning, learners do not understand how to apply the knowledge system they have acquired or in what contexts to use it. This approach emphasizes learning but lacks practical application and utilization, leaving learners with a superficial understanding and preventing them from applying what they have learned to life, work, society, and the environment. Against this backdrop, new practical teaching methods for sustainable development in higher education have emerged.

5. Teaching Philosophy in Contemporary Higher Education

In response to the shortcomings of traditional one-way teaching methods in higher education [6], it is crucial to consider the interaction between the teaching system and the learning system. The interaction between teachers and students within the teaching and learning systems, supported by teaching scenarios, represents a key focus of higher education and is central to the sustainable development of higher education.

Against this backdrop, the effective interaction and communication between the teaching system and the learning system are of paramount importance. The introduction of the interactive, two-way Problem-Based Learning (PBL) approach, where teachers elaborate on the theoretical knowledge system and guide students to reflect on the current state and issues of the theories they are learning, enables learners to engage in collaborative group discussions to solve problems encountered during the learning process. This method encourages learners to engage in autonomous learning, action learning, and self-directed learning within specific teaching scenarios. By applying the theories they have learned to analyze local environments and enterprises, this new practical teaching approach achieves the integration of learning and application, as well as the fusion of industry and education.

6. The Core Connotation of Sustainable Development in Higher Education

The concept of sustainable development provides universities with a more feasible, rational, enduring, and sustainable opportunity to align with local economic and social development. The key

question is how higher education institutions can transcend the limitations of traditional teaching methods, develop new practical teaching approaches, and construct resilient and adaptive long-term development mechanisms.

Therefore, this study constructs a new practical teaching methodology for higher education that is more systematic, logical, and structured, aimed at achieving sustainable and enduring development, thereby demonstrating the perpetual sustainability and vitality of education for sustainable development. The core essence of implementing this new practical teaching approach lies in the continuation and transmission of the teaching, learning, and contextual systems, which must be addressed through dimensions such as the theoretical curriculum framework, teaching methods, teaching strategies, and teaching scenarios.

6.1 Curriculum Theoretical System

Each course requires the confirmation of its knowledge framework, which constitutes the instructional content of the course. Taking the "Market Research and Forecasting" course as an example, the theoretical knowledge system is first established, comprising seven theories aligned with local economic development. These theories assist learners in bridging gaps in their understanding of the local environment. First, the macro-environment theory helps learners comprehend the local environment. Second, the industrial analysis framework theory guides learners to reflect on the components of industries and consider the types of local industries. Third, the brand theory encourages learner groups to refer to the United Nations' 1971 International Standard Industrial Classification of All Economic Activities and select corresponding branded enterprises as subjects for practical research, thereby understanding the development of local brands. Fourth, the situation analysis theory motivates learners to analyze the current state of the selected branded enterprises, identify issues, and examine problems. Fifth, the corporate identity system theory guides learners to understand corporate philosophy, codes of conduct, and corporate identity systems, enabling them to grasp the identity systems of local enterprises. Sixth, the target market marketing theory directs learners to analyze the target customer segments, target markets, and positioning of local enterprises. Seventh, the marketing strategy theory guides learners to comprehend the product lines, pricing, distribution channels, and promotional methods of enterprises.

6.2 Integration of Teaching Methods and Teaching Strategies

The instructor systematically presents seven theoretical frameworks related to local environmental contexts, guiding students to master each theory's 5W1H components: originator (Who), content (What), rationale (Why), source (Where), publication date (When), and application method (How). This comprehensive approach ensures deep theoretical understanding.

Through Problem-Based Learning, the instructor transitions from knowledge transmitter to facilitator. Using Porter's 1980 industrial analysis framework as an example, students learn theoretical fundamentals, reflect on core concepts, articulate theoretical significance, then apply the five forces analysis to real industry assessment. This process culminates in transformed outcomes including competition entries, research publications, and innovation projects.

Action-oriented learning further promotes theoretical engagement by examining scholarly discourse and practical implications. Through collaborative activities and field research, students develop understanding of theory-practice integration, recognizing theories as dynamic tools for problem-solving. This approach enhances learning motivation and fosters critical thinking about theoretical application.

6.3 Teaching Scenarios

While teachers impart theoretical knowledge, the crucial challenge lies in enabling students to apply these theories in practice. Integrating teaching scenarios addresses this by creating contextualized learning environments. In the "Market Research and Forecasting" course, a corporate governance structure is implemented: the instructor serves as Chairman, while students assume leadership roles including General Manager, Deputy General Managers, and functional leaders. This four-tier hierarchy (Chairman-General Manager-Deputy Manager-functional leaders) operates through Action Learning, where students campaign for positions and manage team responsibilities.

Each group selects a local enterprise from diverse industries aligned with the UN's 1971 International Standard Industrial Classification. For instance, a group studying Xiaomi Technology must gather adequate recent academic literature. Insufficient resources necessitate switching enterprises to ensure viable theory-practice integration. This approach enables systematic analysis of local enterprises' conditions and challenges within authentic learning scenarios.

7. Methods for Achieving Sustainable Development in Higher Education

The governance model for sustainable development in higher education emphasizes a dynamic balance between strategic leadership and organizational adaptability. It requires higher education institutions to develop a keen environmental sensing capacity, enabling them to promptly identify changing trends in internal and external environments and make forward-looking strategic adjustments. This promotes sustainable development that aligns with the needs of local economic and social development, which in turn necessitates support from organizational leadership and coordination with organizational development to establish a governance model that underpins sustainable development [8].

7.1 Governance Model for Sustainable Development

The optimization of the academic governance structure serves as a critical guarantee for sustainable development. Organizations for sustainable development in education at all levels—including the Faculty Development Committee at the college level, the Teaching Research Association at the departmental level, course module teams, and individual instructors—must comprehensively implement and execute the philosophy of the university's sustainable development initiatives. This involves establishing a tiered cultivation system for sustainable development in education, constructing organizational learning mechanisms across all levels, refining the promotion of new practical teaching methods, and implementing interactive educational approaches such as Problem-Based Learning and Action Learning, alongside the "Learning, Thinking, Expressing, Applying, and Transforming" teaching strategy and the "Corporate Governance Approach" teaching scenario.

The improvement of organizational learning mechanisms serves as the foundation for maintaining sustainable development in higher education. Higher education institutions need to establish systematic platforms for experience accumulation and knowledge sharing to facilitate the dissemination and promotion of best practices. Regular institutional evaluation and revision mechanisms ensure that the sustainable development of higher education evolves with the times, maintaining its relevance and effectiveness.

7.2 Student-Centered Learning System

The student-centered approach redefines the teaching-learning relationship [7] by shifting focus from instructional delivery to learning experiences and developmental outcomes. Curriculum design should transcend traditional disciplinary boundaries and prioritize practical competence development. An industry-education integrated structure expands student development opportunities, while agile content updates incorporating cutting-edge theories must align with local socioeconomic needs. This ensures acquired knowledge effectively serves local enterprise development.

Teaching innovation forms a crucial component of learning system reform. Methods like Problem-Based Learning and Action Learning stimulate student autonomy and inquiry, while the "Learning, Thinking, Expressing, Applying, Transforming" strategy enables practical knowledge application in life, work, and local contexts, advancing sustainable higher education.

Learning evaluation reform significantly promotes holistic development. Implementing Outcome-based Education with the aforementioned strategy allows students to produce diverse outcomes - from academic competitions to research publications - that better reflect their practical abilities.

7.3 Trinity of Industry, Education, and Environment

Against the backdrop of transforming knowledge production models, the trinity framework integrating industry, education, and the environment has become crucial for addressing cross-domain changes. This transformation requires higher education institutions to break away from traditional teaching methods and establish a more flexible and open system of new practical teaching approaches that integrate academic instruction, local industrial needs, and local environmental sustainability.

Specifically, in response to the wave of sustainable development, the theoretical knowledge system taught in higher education must align with the talent requirements of local industries to cultivate professionals who can meet the needs of local environmental sustainability.

Conclusion

This study examines the differences in teaching effectiveness between traditional teaching methods and new practical teaching methodologies, further developing a sustainable approach to higher education that enhances students' willingness and interest in learning—a topic worthy of ongoing attention.

This paper introduces a new practical teaching methodology to address the limitations of traditional one-way instruction, which lacks bidirectional communication and interaction. By integrating teaching systems, learning systems, teaching methods, teaching strategies, and teaching scenarios, it guides learners to connect theoretical knowledge with local environments, industries, enterprises, and brands. This approach encourages learners to analyze current situations, identify existing problems, and develop solutions, thereby achieving the integration of theoretical learning and practical application in enterprises. It enables the application of knowledge in life, work, business, and the environment, while motivating students to produce diverse forms of outcomes.

Sustainable development in higher education represents a systematic, structured, and logical innovative approach. It requires aligning talent cultivation with local economic development trends, forming a highly feasible trinity framework of industry, education, and the environment. The systematic steps of this framework include defining the theoretical knowledge system for each course, the instructor's teaching methods and strategies, the learners' study approaches, and the contextual interaction between instructors and learners. This structured methodology supports systematic teaching, enhances students' learning willingness and interest, and leads to improved learning outcomes. Furthermore, it contributes to the systematic advancement of sustainable and enduring development in higher education, offering new perspectives for subsequent research and its extension to different faculties and connections with various local industries.

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