A Review of the Experimental Teaching Design of High School Curriculum Based on OBE Concept

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Abstract: This paper first summarizes the relevant theories by sorting out the relevant articles about OBE education concept and teaching design at home and abroad, and then uses the literature analysis method to sort out the research status of high school curriculum experimental teaching design based on OBE concept, so as to provide reference for introducing OBE concept into middle school curriculum experimental teaching.

Keywords: OBE Concept; Teaching Design; Experimental Teaching in Middle School

1. Progress of Teaching Design Research at Home and Abroad

In his book "Principles of Instructional Design," the renowned American scholar Gagne defined instructional design as a systematic process for planning teaching systems. He proposed a comprehensive instructional design framework and provided a detailed classification of learning outcomes in the book. In his article "What is Instructional Design?", Patton stated, "Instructional design is a process that uses scientific principles to meet human needs and solve academic problems." American psychologist Reigeluth noted that instructional design is a discipline aimed at understanding and improving the teaching process, with the core goal of proposing optimal teaching methods to achieve the anticipated changes in students' knowledge and skills. He also emphasized that the ultimate aim of instructional design is to enhance teaching practices. American scholar Kemp defined instructional design as "a systematic approach to analyzing and researching the interrelated issues and needs within the teaching process. It involves establishing methodological steps to address these issues in a continuous model, followed by evaluating the outcomes of the teaching process." He introduced the first-generation instructional system design elliptical structure model, which categorizes the factors influencing instructional design into the inner ellipse and the evaluation and modification into the outer ellipse. This model highlights the continuity of instructional design, emphasizing overall evaluation and modification in relation to other teaching elements. Merrill believes that teaching is a science, and instructional design is a technology built on this scientific foundation. Therefore, instructional design can also be considered a scientific technology. The goal of teaching is to impart knowledge and skills to students, while the purpose of instructional design is to create and develop learning experiences and environments that facilitate the acquisition of these skills. He also introduced the five-star teaching model, which emphasizes both the teaching process and the importance of the learning process. Research indicates that some scholars highlight the importance of instructional design in its implementation, while others emphasize the significance of the external environment. Overall, the development of instructional design abroad has achieved significant results, making important contributions to improving teaching quality and effectiveness and providing theoretical guidance for future researchers.

Research on instructional design in China spans multiple disciplines, including pedagogy, psychology, and computer science. The research primarily focuses on teaching reform, models, and core competencies. Scholars have analyzed the essence, characteristics, and principles of instructional design from various perspectives, tracing its development, summarizing theoretical achievements and practical experiences both domestically and internationally, and studying methods and technologies for instructional design. They also explore how to use modern educational technologies, such as multimedia, networks, and virtual reality, to enrich teaching content and methods, thereby enhancing students 'interest and

engagement. Additionally, scholars have explored personalized teaching methods and strategies tailored to students' characteristics and needs, aiming to achieve the goal of teaching according to individual aptitude, thus enriching the research on instructional design in China. Regarding the evaluation system of instructional design, domestic scholars have studied how to establish scientific and reasonable evaluation indicators and methods to comprehensively understand students 'learning situations and teaching outcomes. They have also discussed how to use diversified evaluation methods, such as peer evaluation and project evaluation, to stimulate students' motivation and innovative spirit.

2. Research Progress of Outcome-Oriented Education

Outcomes-based education, introduced by American scholar William G. Spady in 1981, emphasizes that the ultimate goal of learning is the acquisition of knowledge and skills by students, rather than their academic performance. This concept was first articulated in his seminal work, "Outcomes-Based Teaching Management: An Inquiry from a Sociological Perspective," where he advocated for schools to integrate all educational elements to set clear learning outcomes. These outcomes guide students to act according to these expectations and to demonstrate their learning achievements. The core beliefs supporting this approach include: every learner has the potential to succeed, depending on the speed and method; success leads to more success; schools can create an environment that fosters success; clear and evidence-based learning outcomes are essential; it is important to focus on the higher levels of achievement students will achieve after graduation, not just on curriculum design; and it is crucial to track the responsibilities of all stakeholders, including students, teachers, employers, and industry experts. This approach aims to spur schools to implement changes in curriculum, teaching, and assessment methods.

Based on Spady's theoretical framework, subsequent research has delved into the core principles of outcome-based education: this educational paradigm focuses on' learning outcomes' as a key aspect[1]. It is an educational system that centers on learners and aims for effectiveness, with the core concept being to ensure that all individuals receiving education can achieve effective learning and success. Moreover, this model focuses both teaching practices and evaluation mechanisms on learning outcomes, which encourages educational institutions to continuously monitor learning outcomes and establishes a comprehensive learning responsibility assurance mechanism.

Inspired by Spady's academic ideas, Harden[1]and other scholars gradually shifted their focus to the construction of a theory system for outcome-based education (OBE), emphasizing that clearly defining learning outcomes is crucial for helping students set clear goals for their course studies. Acharya then systematically expanded this theory, innovatively proposing four key components of OBE implementation: first, defining learning outcomes, which involves setting clear goals for course teaching based on the characteristics of different subjects; second, designing pathways for achieving these outcomes, including restructuring the curriculum, reverse planning, and setting specific teaching objectives; third, focusing on innovating evaluation mechanisms, emphasizing the need to move beyond traditional single-test assessment methods to establish a diversified system for evaluating learning outcomes; and finally, exploring the practical transformation of learning outcomes, ensuring that theoretical knowledge can be effectively integrated with real-world applications. In their article "Outcome-Based Education: A Review of Its Origins, Theoretical Foundations, and Empirical Evidence," Mollie Butler and DornanT systematically traced the evolution and theoretical foundation of the OBE concept, and also argued from a philosophical epistemological perspective the feasibility of this educational model[2].

The theoretical origins and practical explorations of the OBE educational philosophy began in overseas academic circles. International scholars have conducted systematic research on its theoretical content and practical approaches from various perspectives, establishing a relatively mature theoretical framework. This academic accumulation not only deepens the academic community's understanding of this concept but also provides valuable theoretical references and practical models for Chinese educational researchers to explore further.

Taiwan, China The regions of Taiwan, China and Hong Kong were the first to initiate research on outcome-based education, while mainland scholars 'attention to this field was relatively delayed, only beginning to gain recognition in the

education community by 2012. Jiang Bo was the first to systematically propose the theoretical framework of' outcome-based education. 'This study explored the historical origins and essential characteristics of this educational philosophy, and provided a comprehensive explanation of the core concept of' outcomes 'from multiple perspectives, including definition, system construction principles, and basic assumptions. As the concept of outcome-based education has evolved, related research has seen a rapid growth trend. Shen Tianen theoretically elaborated on the criteria for defining learning outcomes, quantitative assessment, and evaluation mechanisms, delving into the theoretical roots of outcome-based education. He rigorously analyzed the teaching design paradigm based on this concept and ultimately confirmed its practical feasibility through empirical research. Gong Jianmin analyzed the theoretical construction and practical approaches of learning outcome design within the OBE model, arguing that the core characteristic of the' expected learning outcomes' is that the goal of outcomes has clear and specific operational paths and quantifiable evaluation standards. He systematically explained the logic of learning outcomes and implementation strategies.

Considering the various limitations of traditional education models in talent development, promoting educational reform has become a widely recognized goal in current educational research. Wang Guicheng and his team, based on an analysis of the historical development and characteristics of outcome-based education (OBE), conducted a comprehensive examination of China's current education system. They theoretically validated the applicability of OBE to China's educational reforms and provided specific practical guidelines. Xiao Fuli, Song Bei, and others systematically studied and discussed the connection mechanism between specialized and undergraduate education based on the concept of outcome-based education. They proposed an innovative talent cultivation model integration approach, setting corresponding course and credit requirements from the perspectives of national education, enterprise development, school positioning, and student employment, thereby achieving a new model of positive interaction between school and society. Feng Jianguo, based on the concept of outcome-based education in engineering education accreditation, systematically constructed the implementation path of the practical teaching quality assurance system. He focused on providing specific implementation methods for the quality control mechanism of practical teaching and the assessment evaluation system. This research promoted a shift in teaching models from teacher-centered instruction to student capability development, facilitating the transformation of theoretical knowledge into practical application, and effectively enhancing the overall quality of practical teaching. Dongyang has carried out teaching reform practice around the life education curriculum, and conducted systematic analysis in multiple dimensions such as curriculum design concept, content structure, teaching strategy and evaluation system. By constructing the "experience-reflection" double helix teaching mode, students are encouraged to form a scientific view of life and life values, and achieve the maximum development of individual life education.

3. Research on Experimental Teaching Design in Middle Schools Based on OBE Concept

Research on teaching design based on the OBE philosophy in China is continuously expanding. Lu Xin has defined course objectives, organized teaching content, designed teaching segments and methods, and established evaluation methods to implement the OBE philosophy, thereby enhancing educational quality. Yao Jing and colleagues have proposed a constructivist teaching method and project-driven teaching design based on the OBE philosophy, integrating projects with classroom assignments, experiments, and exams to make students more proactive in their learning and improve their practical skills. Zhang Jingyang and colleagues have applied the OBE philosophy to teaching design, focusing on the goals and effects of ideological and political education in courses. Bai Dandan has conducted chemical classroom teaching design based on the OBE philosophy.

In recent years, educational scholars have gradually integrated the outcomes-based education (OBE) philosophy into secondary school subject teaching. Scholars have explored OBE-based teaching design methods and approaches from various perspectives, highlighting the applicability of OBE-based teaching design across different disciplines. Lu Mengting and Zhao Qing, for instance, used the lesson 'Exploring Guilin's Scenic Beauty 'as a case study to detail the OBE-based high school

geography teaching model. They proposed implementation strategies such as' transforming educational concepts, adopting flexible teaching methods, focusing on learning outcomes, and reflecting on evaluation results, 'providing valuable references for the application and promotion of OBE theory in high school geography teaching. Huang Kaiyue studied the integration of OBE philosophy into junior high school biology teaching, particularly in fostering scientific thinking, which offers valuable insights for teachers conducting teaching reform research. Chen Haibin and others explored OBE-guided chemistry experiment teaching using the' Properties of Iron and Its Compounds' experiment as an example. Liu Hongtu, based on the actual conditions of physics experiment teaching, proposed a multi-dimensional quantitative teaching evaluation method that uses the achievement of teaching objectives as a reference standard, providing a basis for the continuous improvement of physics experiment teaching[3].

To sum up, the concept of OBE is very popular in the domestic academic circles. However, there are few relevant literatures on integrating the concept of OBE into middle school experimental teaching, which indicates that the research on combining the concept of OBE with middle school experimental teaching in China is still in the development stage, and there is still a lot of work to be done in this aspect in the future.

Acknowledgments

This article is supported by the 2025 Qujing Normal University School level Industry Education Integration Reform Project: Building a Knowledge Graph System for Animal Biology Experimental Courses Driven by Industry Education Integration (GrantNo. 2025CJRH10)and the third batch of school level first-class courses of Qujing Normal University: Virtual Simulation Experiment on Building a Biosafety Concept Based on Bird Observation under the Background of Dual Carbon (Grant No. YLKC202423).

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