

Study based on blended learning design and effect assessment under the concept of OBE

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Abstract: In the context of the transformation of the teaching paradigm and the building of a strong country in education in the new era, how to explore the blended learning design of the era of digital education, by grinding out the five aspects of teaching objectives, teaching content, educational activities, learning methods, methods of evaluation, etc. under the concept of OBE, it has been proposed to focus on efficient and reflected in "student-centred" teaching and teaching hybrid design, through the exploration of course building on hybrid learning design optimization pathway problems, to contribute to the efficient achievement of curriculum goals, discipline building and talent development.

Keywords: Curriculum Construction; Blended Learning; OBE Concept

1. Introduction

Since the eighteenth National Congress of the Party, in order to implement the fundamental mission of the people, the national universities to integrate curriculum thinking into the discipline work has been steadily strengthened. As an important research direction in curriculum construction, blended learning proposes a new model of Blended Learning based on the needs of education and technological development in today's digital age. With the innovation of information technology and software tools, the combination of offline information and online data is conducive to better promoting theoretical research and practical application of blended learning. In terms of technological developments, the availability of the Internet and online learning platforms has provided richer resources and tools for teaching in the field of education. Blended learning design makes full use of these techniques, combining traditional face-to-face teaching and online learning, increases the flexibility and efficiency of teaching. From the theory of learning, Blended learning design is also influenced by learning theory, such as constructivism, social cognitive theory and so on. These theories consider learning to be an initiative-building process in which students need to build knowledge through interaction and collaboration. In terms of teaching effectiveness, mixed teaching can effectively enhance students' learning achievements and interest in learning and promote students' ability to learn independently and collaboratively. An increasing number of educational institutions and teachers are starting to focus on mixed teaching design to enhance teaching effectiveness and student learning experiences. In some countries and regions, education policies are also promoting blended learning in terms of education policy. The report of the Party's 20th National Congress in October 2022 for the first time included "Advancing the digitalization of education", giving education a new mission and new mandate in the comprehensive construction of socialist modernized countries, and further clarifying the programme of action for the future development of education digitalized^[1]. The government and the education sector advocate the use of technological innovation and teaching reform to promote the modernization and personalized development of the education, and mixed teaching design has become an important direction of education reform. High-quality courses are the foundation of subject and professional development. Teaching that is outcome-oriented and centered on student development is essential for achieving educational goals and cultivating high-quality talent. Therefore, mixed teaching design is important and can effectively enhance the teaching effect and student learning experience, providing new ideas and methods for the development of modern education.

2. Literature Review

Outcome-Based Education (OBE) has been discussed extensively in educational literature. One of the foundational definitions comes from William Spady, who is often credited with defining and popularizing OBE^[1]. For a current and widely accepted definition of Outcome-Based Education (OBE), we can refer to more recent academic sources or comprehensive educational texts. A frequently cited and recent definition can be found in works by scholars who have built upon the foundational concepts of OBE^[2].

Outcome-Based Education (OBE) is an educational approach that emphasizes achieving specific, measurable outcomes as the central goal of the educational process. It mainly includes Focus on Outcomes, Student-Centered Learning, Competency-Based, Goal-Oriented, Assessment-Driven, Flexibility and Personalization, Continuous Improvement. Therefore, OBE is about combining educational experiences with the specific skills and knowledge needed for students to succeed, making it a highly focused and practical educational approach. Blending learning was first proposed by American scholars^[3] to combine the traditional learning concept with E-learning purely technical learning concept, the country's earliest Beijing Teachers' University Professor officially advocated the mixed teaching model, that combines the advantages of traditional teaching methods and networking teaching, both play the leading role of teachers guide, inspire, monitor the teaching process, but also fully reflect students as the subject of the learning process initiative, motivation and creativity^[4]. Teachers have proposed the conceptual framework and analytical framework for mixed teaching, defining the widely accepted concept at home and abroad as "the mix of online learning and face-to-face learning", and dividing the evolution of concepts into three stages^[5].

The application of mixed teaching is very broad, involving the development of the teaching capacity of mixing teaching, exploration and practice. For these elements, Chinese scholars have done many fruitful research, producing a bunch of influential research results, these results for people to understand and explore the academic progress in this field, provide a referable theoretical basis. There are relevant applied studies Abroad "The integration of proactive and experiential learning methods and activities, as they relate to the development of real skill building, communication, problem-solving and critical thinking skills of learners"^[6]. Researchers explored how mixed learning can enhance social cohesion through the use of online technologies, collaborative and blended learning^[7].

Some researchers have created effective learning experiences through a blended approach that combines online activities with the best face-to-face teaching^[8]. Academic researchers in the field of blended teaching are achieving increasing success in their studies, and their perspectives are becoming broader, encompassing specialized theoretical research.

In China, some scholars have done a lot of work for the concept and development of mixed teaching in China, and the research of mixed learning is rich and diverse. For example, the research on mixed teaching ability has promoted the formation of teachers' mixed learning ideas and the improvement of teaching skills, improved the development strategy of improving teachers' mixed education ability, and constructed a model for the development of teachers' mixed training ability through qualitative element analysis method^[9]. Learning is a meaning-building process. Learning is equally important to learners and teachers. The cognitive structure theory focuses on how learners apply their original cognitiveness structures and beliefs to build new knowledge, and emphasizes learning initiative, social and contextual learning theory^[10].

Blended Learning research has begun to develop rapidly at home and abroad, and research results are also constantly developing and innovating. From the current scope of research in the academic community, theoretical research of mixed teaching, especially in theory research, content research, applied research, comparative studies with other teaching models and other fields, has fruitful theory and research results. However, there are certain shortcomings in theoretical research as well, the research perspectives are relatively narrow. Most researchers discuss blended teaching from the standpoint of education and educational technology, with few in-depth analyses and studies that incorporate disciplines such as management, data science, and information security. This has also led to varying research outcomes. Therefore, with the continuous development of mixed teaching, in the context of digital education, we explore the "student-centered" mixed learning mode, study how to carry out the information technology and teaching of intelligent teaching, implement OBE teaching concept, and cultivate excellent talent team, which has very important research significance and practical value.

3. Analysis of the problem of blended learning design

3.1 Mixed teaching curriculum objectives

We analyzed the goals in three aspects, knowledge, skills, and quality. First, the knowledge goals focus on the online presentation of static knowledge, gaining an understanding of the field, and through continuous learning, reflection, and discussion, achieving the process of meaning construction and comprehension. Secondly, there are capability goals, focusing on offline classroom learning and on-site practice. Through teachers designing and organizing teaching activities, direct interaction, and practical guidance, it helps to build and produce practical outcomes. The third is the quality objective, which focuses on the organic integration of online and offline blended teaching. In the process of individual autonomous learning and collaborative practice, we aim to jointly create a valuable, profound, and effective learning atmosphere to achieve quality goals.

3.2 Mixed teaching content system

How to build a mixed learning content system need to take into account the teaching objectives, teaching contents, methods of teaching, educational resources, evaluation methods and teaching environment, etc., to ensure that it can effectively teaching goals and improve student learning results. We need to choose the appropriate mixed teaching content, including theoretical knowledge, case analysis, practical operation, etc., to ensure that the content is rich, which can attract students' interest, and improve their learning motivation. We need to integrate rich teaching resources, including textbooks, videos, online courses and so on. Providing students with diversified learning channels and resources can support students to acquire the knowledge and information they need during the activities.

Therefore, we have implemented some innovative activities in terms of teaching content and resources. In terms of teaching content, we select appropriate blended learning materials, including theoretical knowledge, case analysis, and practical operations, to ensure that the content is rich, can capture students' interest, and enhance their motivation to learn. In terms of teaching resources, it is important to integrate a wealth of materials, including textbooks, videos, online courses, and more. Providing students with diverse learning channels and resources can support them in acquiring the knowledge and information they need during activities.

3.3 Design of mixed teaching activities

How to design a mixed teaching activity requires consideration of the objectives, types of teaching activities, student involvement, teacher roles, teaching resources, timing, and many other aspects to ensure that it can effectively promote learning and improve their learning outcomes. Comprehensive analysis of on-line organic integration and activity design is the main consideration, which involves how to organize and manage off-line learning activities, statistics and analysis of online learning activities data, and ultimately the overall effect of on -line blended learning analysis, feedback and evaluation.

3.4 Mixed teaching strategy approaches

How to combine the advantages of online teaching and face-to-face teaching to design effective teaching methods, such as discussion, group collaboration, practice, etc., to promote student interaction and cooperation. This requires not only the support of the technical platform, but also the preparation of teachers for the methods and strategies of mixed teaching. Furthermore, with regard to online learning and distance learning strategies, these findings can provide a basis for learning methodology strategies in a mixed learning environment to enhance students' self-learning awareness and develop students' deep learning capabilities.

3.5 Comprehensive evaluation of mixed teaching

How to design appropriate assessment methods, including assignments, exams, projects, etc., to ensure that students' learning outcomes and abilities can be assessed comprehensively. In order to promote the development of hybrid teaching and research, it is necessary to conduct comprehensive, systematic, in-depth, long-term online data collection to provide data support for effectively evaluating

blended learning, these are important issues worth studying.

4. Implementation of a blended learning design path

Based on the case analysis of the design and practice of mixed teaching, the implementation requires clearly defining the five main elements of the mixed learning design, objectives, content, activities, methods and evaluation. We used the information teaching platform and environment, changed the traditional classroom teaching method, innovated the hybrid online and face-to-face teaching, and took the “software engineering” course as an example to realize the effective path of hybrid learning design.

4.1 Clear curriculum objectives to knowledge, competence and quality goals

Following the outcome-based education concept, OBE focuses on student curriculum capacity development and highlights the achievement of students' multi-level capacity goals, For example, students 'basic competence objectives and students' core competencies. We carry out course practice operation, with independent learning, cooperative learning, research learning and other ways of course design.

OBE follows a results-based education philosophy, focusing on the development of students' competencies in the curriculum and highlighting multi-level competency goals. The first goal is to achieve basic knowledge objectives, which involve understanding and mastering fundamental knowledge and skills, constituting the core competencies of students. This is accomplished through practical course operations. The second is the design and implementation of students' comprehensive practical abilities, achieved through independent learning, collaborative learning, and research-based learning to complete course design. The third is the high-level capability goals, which include students' abilities in technological innovation, participation in technology innovation competitions, involvement in research projects with mentors, publication of papers, and patent applications. By cultivating students' core competencies and technological innovation abilities at three different levels, a solid foundation is provided for their personal.

4.2 Reconstructing curriculum content to reflect high-level, advanced and challenging

Based on the OBE teaching philosophy, we have defined learning outcomes, established a curriculum system, designed teaching strategies, and created a matrix of course objectives and graduation requirements to clarify their correspondence.

The course comprehensively summarized 32 knowledge points, systematically completed the production of 32 micro-videos, and shared them with all the teachers in the course group. We aim to develop students' theoretical practice and innovative abilities, deepen the reform of teaching methods in theoretical practice and technological innovation, and implement case and project-driven blended teaching.

When teachers conduct case theory education, they combine teacher projects with case collection for course learning, making it easy for students to grasp the key points and difficulties of the course. In our project-driven practical teaching, students' learning activities are driven by the development process of projects and innovative design practices, achieving a diversification of practical projects and innovative curriculum design.

4.3 Design teaching activities focusing on students' participation and experience

In our project-driven practical teaching, students' learning activities are driven by the development process of projects and innovative design practices, achieving a diversification of practical projects and innovative curriculum design. The roles of teachers in activities have been clarified, including guidance, promotion, and evaluation, to ensure they can effectively lead student learning and provide timely feedback. The objectives of each teaching activity have been defined to ensure consistency with teaching goals and learning outcomes. By categorizing the types of activities and selecting those suitable for blended learning, such as discussions, case analyses, and practical operations, we can promote active learning and interaction among students. This helps students engage in activities like individual study, group collaboration, and online discussions, encouraging them to participate actively and collaborate with others.

4.4 Innovative teaching methods to promote flexible and diverse and efficient teaching

We focus on flexibly using various efficient teaching methods in accordance with the course's teaching objectives, in order to meet the needs of a "student-centered" blended teaching model, both online and offline. We adopt heuristic teaching methods to guide students to think positively, further stimulate students' learning enthusiasm and initiative, and cultivate students' habit of in-depth research and exploration. Using multimedia support method, making full use of PPT technology, using mind map for demonstration, can stimulate students' interest in learning.

By adopting the flipped classroom approach and utilizing online micro-video and audio resources, we can broaden students' learning horizons, allowing them to study conveniently before, during, and after class, thereby enhancing their overall abilities. Modular practice can train and improve learning outcomes. By adopting case-based teaching methods, selecting examples such as library borrowing systems and teaching resource management systems, we can combine systematic learning with software design through training in abstract thinking skills. This approach cultivates engineering development capabilities and enhances application skills. We adopted a project-driven approach to systematically conduct the comprehensive practice of knowledge and skills in a complete project to improve the overall competence of the system project.

4.5 Construction of multidimensional evaluation and refinement of formative evaluation indicators

Based on the requirements, indicators and teaching objectives of the mixed course objectives, the corresponding teaching activities, the formative evaluation objects and methods were elaborated in detail, and the curriculum objectives (knowledge, ability, qualities) and the formation evaluation matrix were proposed.

The final evaluation is the final examination of the course. The formative evaluation mainly involves SPOC learning (30% online), on-line practice (10%) and course design practice (10% face to face).

According to the formative evaluation objects of different learning stages, the combined learning course SPOC learning, classroom learning, on-premises practice, curriculum design practice of the comprehensive formational evaluation indicator, and fine-tuning the generated formative assessment sub-indicator, the indicator system uses quantitative and qualitative comprehension evaluation method, to manage the student's learning process and obtain real platform activity data.

5. Conclusion

Based on OBE (Outcome-Based Education) results, the combination of online and face-to-face blended teaching has significantly improved the effectiveness of the course. Firstly, by integrating online courses with classroom instruction, the teaching arrangements have become flexible and diverse, making it easier for students to grasp theoretical knowledge and practical skills. The teaching outcomes have been positive.

Secondly, through the guidance of teaching videos before the course, classroom instruction was enhanced, achieving an interactive model of online teaching in the new era of "Internet + Education." This has fostered students' self-learning awareness and expanded the depth and breadth of course knowledge. Through the course study, students' ability to analyze software design has been gradually developed, guiding them in software engineering course design and achieving the cultivation of their application skills (disciplinary objectives). Through project case teaching, students are guided to independently carry out projects, achieving the cultivation of their comprehensive practical abilities (engineering objectives). Through the statistical analysis of data on the SPOC platform, students can manage their learning process through a "self-check + problem guidance" approach, which is beneficial for the development of process-oriented course evaluation methods for students.

Finally, the after-class SPOC learning platform can address difficulties, achieving interactive online learning communication and guidance.

In the context of national quality curriculum construction, advocating and implementing the idea of OBE, developing "student-centred" teaching, play the advantages of online and offline mixed teaching. In combination with the learning analysis of our students, the organization and implementation of teaching is conducive to innovative mixed learning design, reflecting the advantage of online course

content guidance, strengthening the effectiveness of offline course practice, focusing on the integrity, systematicity and consistency of online offline course construction, promoting effective linkage and organic integration within and outside the classroom, achieving the efficient construction of high-quality courses, thus better serving the high level of multidisciplinary development and high quality training of school talent.

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