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The Construction of a Combined OBE-based Teaching Model

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Abstract: This paper proposes a teaching model based on the concept of outcome-based education (OBE). OBE is meant to be a student-centered learning model. Based on OBE, the characteristics of project-based learning (PBL) and lecture-based teaching approach are analyzed. Then, a combined teaching model is constructed based on Acharya's research findings and PBL. This proposed model integrates PBL and lecture-based teaching approach to help achieve ideal learning outcomes. It enhances learners' learning initiative and creativity while ensuring holistic and systematic learning outcomes.

Keywords: Learning outcomes; OBE; PBL; Lecture-based teaching approach

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1. Introduction

Rapid advancements in science and technology have a profound impact on all aspects of economic development, industrial structure, and the way of life around the globe, posing new challenges to China's strategies, such as the strategy of strengthening the nation through human resource development and the strategy of building an innovative country. China is witnessing major changes unfolding in the world, something unseen in centuries. There is an urgent need to develop innovative, applied, and compound talents across the fields of science, technology, and engineering. This requires profound changes in education. With the advancements of research in the fields of learning sciences and information technology, new educational concepts and educational technologies have emerged, all of which have an impact on traditional educational models that are built on the lecture-based teaching approach. The lecture-based teaching approach is centered on teachers, textbooks, and classrooms. Teachers assume the leading role to ensure overall, systematic, and coherent teaching. This method offers high learning efficiency; however, with the advancements of research in learning sciences (LS), which is centered on the science of knowledge and cognitive science, shortcomings of the lecture-based teaching approach have become increasingly apparent, suppressing learners' independence, initiative, and creativity. In this regard, new pedagogical ideas emphasizing learner-centeredness, supported by constructivism and information technology, are being established, thus introducing a whole new dimension to educational efforts. Among them, the most representative ones are the outcome-based education (OBE) model [1] and the project-based learning (PBL) model [2]. OBE guides teaching and learning from a macro perspective, with the future-oriented achievement of expected goals and the development of final competencies of learners as its goals. In OBE, diverse learning methods are designed in line with learners' own characteristics and their own growth patterns. After years of development, OBE has formed a complete theoretical system. The PBL model corresponds to the lecture-based teaching approach, focusing on specific teaching activities from a

microscopic perspective, and promoting learners' active knowledge construction and skill enhancement collaboratively by asking questions and creating project situations. However, PBL is flawed. These deficiencies are exactly what the lecture-based teaching approach can compensate for. Therefore, a combined teaching model is designed under the guidance of OBE. Then, the lecture-based teaching approach is combined with PBL, with an aim to ensure systematic, holistic, and learner-centered teaching, while enhancing learners' initiative and creativity.

2. Theoretical basis

The OBE and PBL models are established based on constructivism [3], contextual learning theory [4], and competency-based education (CBE) [5]. These theories are the theoretical basis for the construction of the combined model in this paper.

2.1. Constructivism

The theory of constructivism was proposed based on the research findings of Piaget, Vygotsky, and others, who firmly believe that learning is a process of meaning construction. Constructivism follows the learner-centered philosophy of teaching, emphasizing four aspects: context, collaboration, conversation, and meaning construction. They reveal the cognitive dynamics in an enlightening way, generate the highest level of motivation for learners, and foster the development of creative thinking.

2.2. Contextual learning theory

Contextual learning theory, which was proposed in the 1980s, asserts that knowledge is authentic and based on certain social contexts before it can be mastered by humans; it emphasizes the importance of practical application. Contextual learning theory proposes that learners learn contextually, authentically, and inquisitively. Contextual teaching creates situations relevant to the learners and leads them to experience and think in these situations in the process of knowledge impartment and skill development.

2.3. CBE theory

After the Second World War, a team of experts led by the United States proposed the theory of CBE, with the focus being on vocational education and competency enhancement training. The theory takes the analysis of vocational activities as the starting point, establishes the teaching objectives based on job knowledge and skill requirements, gradually decomposes so as to determine the teaching objectives and teaching contents, and finally takes learners' knowledge and skill objectives as assessment and evaluation standards. The theory is consistent with OBE's emphasis on result-oriented goals.

3. Construction of a combined OBE-based teaching model

3.1. Analysis of OBE

OBE was first proposed by an American scholar, Spady, and is described in his article *Outcome-Based Education: Critical Issues and Answers*. According to Spady, "OBE clearly focuses and organizes everything in an educational system around what is essential for all students to be able to do successfully at the end of their learning experiences [6]." The Department of Education of Western Australia defines OBE as "an educational outcome which is based on trying to achieve certain specified outcomes in terms of individual student learning." The two definitions show that OBE implies outcomes-based accountability. This means that educational structures and curriculum are regarded as means, but not ends. An education system is based on the outcomes that students actually achieve. OBE emphasizes on individual progress and academic accomplishments. It designs a talent development system based on the expected learning outcomes of learners, shifting the focus from subjects to outcomes, and from teacher-centered education to

student-centered education. The backward design of the talent training system mainly focuses on goals, curriculum, teaching methods, faculty, and evaluation system. Likewise, for each course, it should be designed according to the concept of OBE and implemented positively. Acharya pointed out that the implementation of the OBE model should include four major stages [7]: defining, achieving, evaluating, and applying, as shown in **Figure 1**.

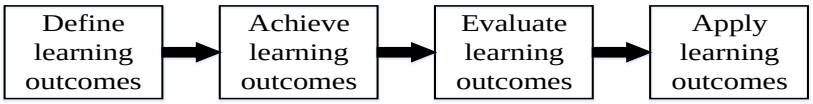

Figure 1. Steps of implementing OBE-based teaching

3.2. Analysis of PBL

PBL originated from the educational theories of the American educator Dewey and was first proposed by Kebchuk in 1981 [8]. PBL focuses on "learning by doing," in which students learn about a subject by attempting to find a solution to an open-ended problem. It guides learners to use technical tools to solve problems and produce effective outcomes during the learning process. PBL, which emphasizes heuristic principles, cooperative learning, and inquiry, has been in high demand ever since it was introduced. It is believed that it will solve the monotonous and dull problems associated with traditional teaching methods and completely reform the teaching ecology of the classroom. The PBL model has five features: (1) driving question; (2) real-world situations; (3) collaboration; (4) using technological tools; (5) creating an artefact. It has six stages [9]: (1) topic selection; (2) project planning; (3) activity exploration; (4) project creation; (5) project results assessment; (6) project evaluation (**Figure 2**).

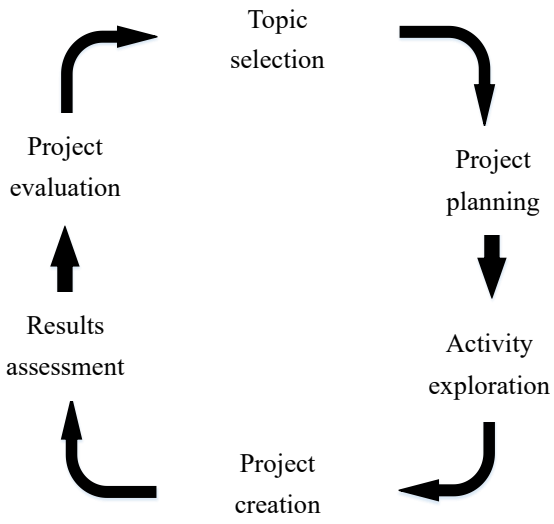

Figure 2. Stages of PBL implementation

3.3. Analysis of lecture-based teaching approach

The lecture-based teaching approach is a teacher-centered learning model. As a traditional teaching model, this approach has been commonly used in classrooms. It has three characteristics: (1) it has good teaching efficiency; (2) it enables learners to accurately and comprehensively grasp what they are listening to; (3) it gives full play to the leading role of teachers. In view of this, lecture-based teaching has severely suppressed learners' independence, initiative, and creativity, and thus has faded into history. However, this kind of approach is not a total failure. As a basic teaching model, it ensures the integrity and systematization of the teaching contents, along with high teaching efficiency.

3.4. Construction of a combined OBE-based teaching model

Based on OBE, the characteristics of PBL and the lecture-based teaching approach are analyzed, and a combined teaching model is constructed based on Acharya's research results and the six operational steps of the PBL model with a learner-centered and output-oriented approach (**Figure 3**).

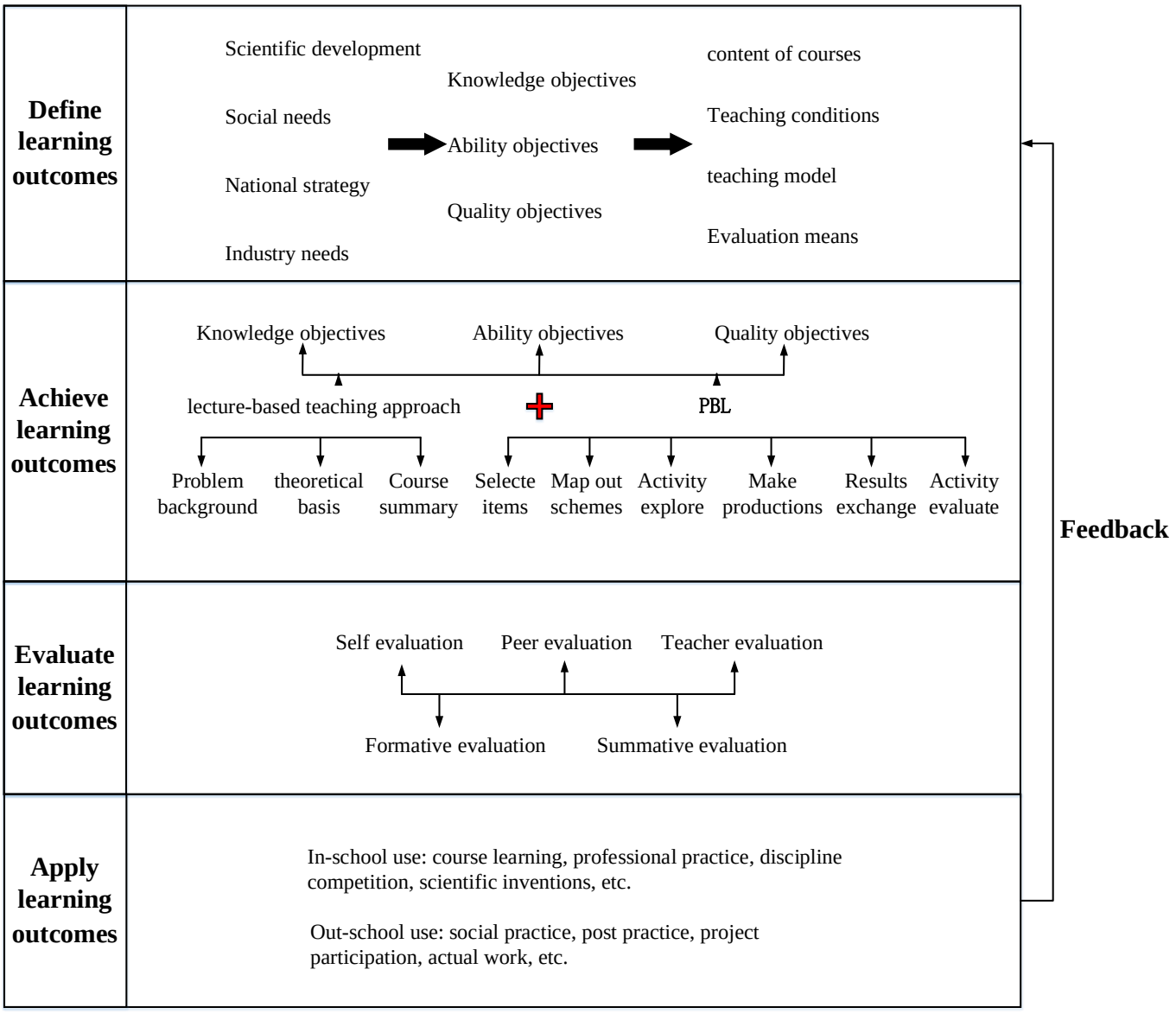

Figure 3. Framework of the combined OBE-based teaching model

In the stage of defining learning outcomes, the knowledge base, technical competence, and overall quality that learners should possess are considered based on various needs, such as the need for scientific and technological development, the need for social and ecological development, and the requirements of various strategies. The teaching objectives should be refined in relation to the theoretical and practical contents of the course to determine what should be taught, thus forming a goal-content teaching mode. On this basis, teachers should modify the design of the course content, the teaching mode, and the teaching conditions that accompany it, as well as determine the evaluation methods for the teaching objectives, so as to determine the effectiveness of the learning outcomes.

In the stage of achieving learning outcomes, a reasonable distinction is made between the applicable parts of the lecture-based teaching approach and PBL based on the course content, in order to achieve the

teaching objectives in terms of knowledge, competence, and personal qualities. The lecture-based teaching approach is used in advance to provide a systematic explanation of the background and theoretical basis of the project-driven problem, which forms the basis for subsequent learners' knowledge construction, skill development, and quality improvement. At the end of the project, the lecture-based teaching approach is reapplied to summarize the course and reorganize the fragmented knowledge constructed by learners, so as to enhance their overall knowledge.

In the core aspect of the course, PBL is used for teaching learners. Teachers should design an activity or "problem" to promote project-based learning. In addition, they should also create real-world situations in which learners can explore the activity. In this process, teachers act as a support and guide to help learners set up collaborative organizations. They assist learners in developing project plans and provide technical tools needed for the project. Following a collaborative exploration of the solutions to the problem, learners then create the artifacts. In this process, learners come together to assess the project results and exchange ideas. After summarizing what they learned and further optimizing their creation, a combined assessment, which includes self-assessment, mutual assessment, and teacher assessment, is used to evaluate the project as well as the project results.

In the stage of evaluating learning outcomes, the learning outcomes are evaluated based on the constructed multiple evaluation index system, including formative and summative evaluations. The evaluation methods include self, peer, and teacher evaluations. In terms of formative assessment, it is recommended to combine the aforementioned three methods to evaluate learners' initiative, creativity, sense of collaboration, and level of participation. In terms of summative assessment, peer evaluation and teacher evaluation are mainly used to evaluate learners' knowledge construction, skill development, and quality enhancement levels.

In the stage of applying learning outcomes, on-campus and off-campus aspects are included. On campus, learners can use the knowledge, skills, and qualities gained from the course in subsequent course learning, professional practice, relevant competitions, as well as scientific and technological inventions and creations. Off campus, the learning outcomes will be useful in social practice, job internships, project participation, and work practice. Learners' learning outcomes should be continuously tracked and redefined according to the course learning outcomes in order to achieve circular feedback and iterative optimization of the teaching model.

4. Analysis of the combined OBE-based teaching model

The combined teaching model proposed in this paper is a learning output-oriented and learner-centered model. This model integrates PBL and lecture-based teaching approach, with the following theoretical characteristics:

(1) OBE focuses on achieving learners' learning outcomes, which detaches the teaching focus from the content of the course; through backward design and forward implementation, course instruction is more specific and effective;

(2) the implementation phase of this teaching model integrates both, PBL and the lecture-based teaching approach; it enhances the initiative and creativity of learners and ensures holistic and systematic learning outcomes;

(3) this teaching model places higher demands on teachers, whose skills should be improved in project design, situation creation, and collaborative instruction, and whose attention should be on relevant topics of interest related to the curriculum.

5. Conclusion

This paper comprehensively analyzes the characteristics of the PBL model and the lecture-based teaching

approach. On the basis of constructivism, contextual learning, and competency-based education, a combined teaching model is constructed based on the OBE concept, which is guided by learning outcomes and centered on learners. This teaching model organically integrates PBL and lecture-based teaching approach in the stage of realizing learning outcomes. It not only improves learners' learning initiative and creativity, but also ensures the integrity and systematicness of learning outcomes, while putting forward higher requirements for teachers.

Disclosure statement

The authors declare no conflict of interest.

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