Research on the Hybrid Teaching of "One Body Two Wings Three Docking" New Business Courses Based on PBCL-CDIO Engineering Management Model

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Abstract. In order to realize the transformation and upgrading of new business professional construction and meet the market's requirements for new business professionals, CDIO engineering management concept and PBCL model are integrated, combined with the teaching mode of online and offline mixed with two wings, and the teaching mode of new business professional courses is designed and implemented. According to the application results, it can be seen that the hybrid teaching based on PBCL-CDIO mode can fully mobilize students' learning motivation, give full play to students' initiative, and help cultivate students' knowledge expansion and exploration ability, critical thinking and language organization ability, which is worthy of promotion and application.

Keywords: PBCL-CDIO Engineering Management, One Body Two Wings Tree Docking, Hybrid Teaching, New Business Major

1 Introduction

With the rapid development of information technology such as big data, 5G, and artificial intelligence, the world has ushered in a new round of technological and industrial revolution. In this context, business majors are facing great challenges due to the decoupling between traditional business majors and the cultivation of talents in today's society[1]. Traditional business majors are guided by the division of functional departments in the organizational structure to cultivate professional talents. In the process of the country's vigorous promotion of the construction of the digital economy, digital knowledge and information, as the core production factors of the digital economy, accelerate the emergence of new industries and new formats through the deep integration of digital technology and the real economy, and cause major changes in social lifestyles, organizational methods, and learning methods, so the pace of transformation from traditional business to new business to adapt to the changes of the times has accelerated[2]. In view of the wide application of information technology in social development, its industry penetration and the continuous promotion of digital construction, the training of business technology talents who can comprehensively use information technology

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use information technology such as big data and artificial intelligence will become the trend and core of new business talent training, so as to realize the transformation and upgrading of new business professional construction [3]. 5G, big data, artificial intelligence, blockchain and other technologies not only enrich people's learning and life, but also make business models more intelligent and flexible, which requires business talents to have higher innovation capabilities to meet the needs of the talent market [4]. Therefore, under the background of new business construction, the critical learning (PBCL) of the integration project and the engineering management mode of CDIO are used in the construction of new business teaching to clarify the direction of teaching construction, improve the construction of curriculum system, improve teaching design, and then improve the innovation and practical ability of new business students.

2 Introduction of the PBCL-CDIO Model

The CDIO engineering education model is the latest achievement of international engineering education reform in recent years. CDIO's engineering education philosophy is student-centered on the life cycle from product development to operation, guiding students to learn professional fundamentals and techniques in a proactive, innovative and relevant way [5]. The core connotation of CDIO is conception, design, implementation and operation, matching and combining the teaching content of theory and practice, and reconstructing the teaching content and teaching methods of the course, so as to better cultivate students' engineering practice ability [6]. The introduction of CDIO concept into the curriculum construction and practical teaching system of business majors meets the needs of society for the transformation of business majors and the development needs of industrial management integration, and at the same time overcomes the blind increase in practical teaching in theoretical teaching, enhances students' interest in participation, mobilizes the enthusiasm of all subjects to participate, and then enriches the teaching platform and teaching methods and improves the teaching effect [7-8].

Project-Based Critical Learning (PBCL) pedagogy is a hybrid teaching method based on problem based learning (PBL) and team-based learning (TBL), whose essence and core idea is problem-oriented, with teachers asking heuristic questions and then guiding students to form teams. The process of mutual collaboration, continuous independent learning to solve problems, and ultimately the accumulation of knowledge and experience. [9]

CDIO model emphasizes the organization and management of the project, integrates PBCL into the CDIO education model, takes the overall operation of the project as the main line, takes the problems encountered in the project operation as the node, focuses on the application of critical thinking and discussion learning, puts forward different problems in stages for program discussion, and in this process, constantly discovers new problems in the program, continuously optimizes the solution, and ensures the implementation of the project; In the operation of the project, the students not only carried out systematic learning and training, but also exercised teamwork, language and thinking skills by constantly discovering problems, analyz-

ing problems and solving problems. The PBCL-CDIO education model combines online and offline teaching methods, practices the dual path of project management and team management, enables students to transform from passive and indoctrination theoretical learning to independent and critical active learning, and continuously cultivates students' planning, design and decision-making skills.

3 Reform of the New Business Hybrid Teaching Model Based on the PBCL-CDIO Education Model

Under the background of "Internet +", the digital economy has changed business education, redefined the mode and content of education, and business talents have been transformed into new business talents with business management knowledge, professional skills and digital skills, and integrated engineering ideas, knowledge, planning, communication and analysis. Based on this, in the construction of new business professional courses, in addition to classroom learning, we should also actively use network resources to obtain advanced knowledge and skills in the industry, use information technology to improve the breadth and breadth of knowledge taught in courses, and cultivate students into compound application talents with cross-professional and interdisciplinary professional knowledge.

3.1 Curriculum System Construction

Guided by the four stages of the CDIO engineering education model, namely conception, design, implementation and operation, PBCL learning is integrated into four stages, and questions are asked in a step-by-step manner at each stage. The problems are related to each other, rolling iterations, the teaching content is connected with the needs of the industry, digital technology is coordinated, offline classrooms and online classrooms are integrated, teaching systems are innovated, teaching reforms are deepened, and a new business course hybrid teaching model of "one body, two wings and three docking" is constructed (as shown in Figure 1).

"One" means to take the four stages of CDIO engineering teaching mode as the main body, the first stage is the conception stage, the teaching teacher needs to combine the teaching content of the course to provide students with multiple practical cases, provide problem background, and then students organize their own teams, independently select topics, teachers put forward "what" problem orientation; The second stage is the design stage, where students find the problems in the case according to their own selected cases, discuss with teammates and teachers, and apply corresponding management methods, such as Delphi method, to find and summarize problems, that is, to put forward the problem orientation of "what to want"; The third stage is the realization stage, which is also the core stage of the PBCL-CDIO model, where students propose solutions with team members for the problems existing in the case, and at this stage, students can propose corresponding solutions and decision-making solutions by comprehensive questionnaire survey method or the application of Internet resources, data analysis, etc., that is, put forward the problem orientation of "how

to do"; In the fourth phase, the operational phase, teachers invite other team members, non-curricular teachers or professionals to evaluate students' solutions and team outcomes.

The "two wings" are the integration of offline classroom and online classroom, and knowledge point explanation, team member case selection, problem discussion and explanation can be completed offline; Case finding, distribution, submission of decision-making cases, expansion of knowledge points, and external expert comments can be completed through digital teaching methods, such as DingTalk classroom, MOOC, micro-course and other online teaching.

The "three docking" is the docking of teaching content and industry demand, the docking of teaching process and business process, and the docking of teaching effect and social evaluation. Build teaching content according to the needs of the business market; Arrange the course opening process in accordance with the business course opening process; Continuous improvement of curriculum teaching based on social evaluation.

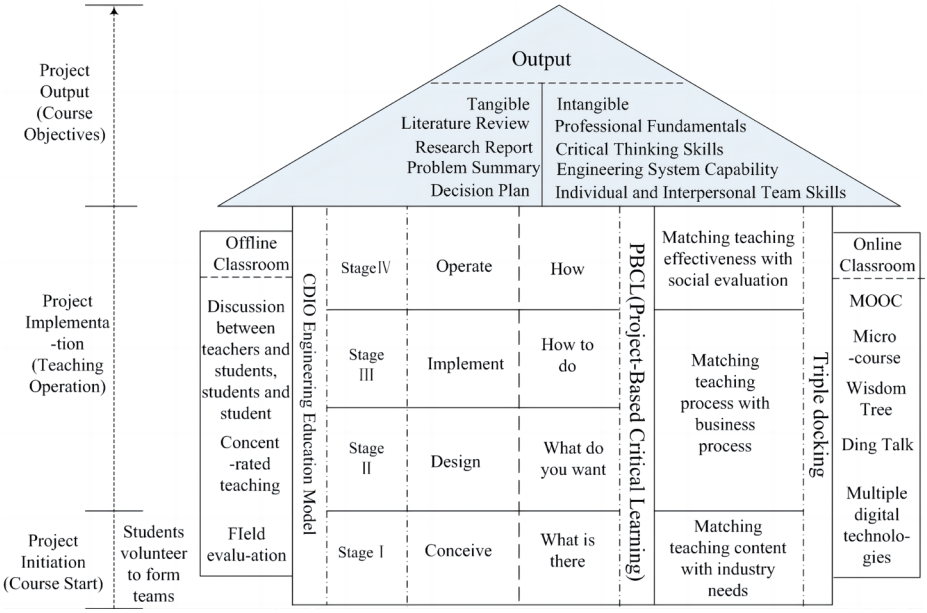

Fig. 1. The blended teaching mode of "One Body, Two Wings, and Three Matches" for new business courses based on PBCL-CDIO mode

In the process of constructing the entire curriculum system, digital technology is continuously applied to promote innovation and iteration of course content and teaching modes, achieve dynamic development of teaching, and cultivate new business talents that meet social needs. The digital transformation of courses requires precise design of professional training objectives and course design objectives, the construction and improvement of more course resources, and the support of teaching platforms and teaching modes; Digital technology presents course content in a three-dimensional and flexible manner to students, while business courses need to be con-

stantly updated and expanded to meet their needs for flexible learning. The core of integrating commercial digital tools into teaching content is to integrate mainstream business models, business processes, practical experience, technological applications with traditional conceptual knowledge frameworks, forming a digital teaching case library, in order to provide students with an environment and conditions to face real problems in the business field[10].

3.2 Implementation Plan for Blended Teaching of New Business Courses Based on PBCL-CDIO Model

The PBCL-CDIO education model integrates offline and online classrooms to realize a professional comprehensive reform project that connects teaching content with industry needs, teaching process and business process, teaching effect and social evaluation. In the implementation process, each stage is decomposed to form phased problems, and critical discussion is carried out, and the teaching progress is continuously adjusted according to students' knowledge mastery, overall learning ability, comprehension ability, and difficulty of each part, and the integration of problem-oriented and critical discussion, offline and online hybrid mode, formal learning and informal learning is strengthened to strengthen students' interest in learning and task completion efficiency, so as to achieve the purpose of "learning by doing" and "learning by doing" [10].

Project selection and publishing phase. Teachers select cases and publish them through online classes. Case selection needs to be based on the actual market background, select real and in line with the course requirements of the case, the selection of the case should be able to reflect the knowledge points of the corresponding topic, to ensure that the teaching content and industry requirements are not out of touch, the teaching process is based on the business process, so in order to ensure the quality of teaching, the selection of cases should have a certain representativeness and typicality, difficult and moderate real cases. Students are free to form teams to choose cases.

The teaching phase of the course. In this phase, the curriculum will be based on the four phases of CDIO. Conceptualization stage: Teachers need to clarify teaching objectives in order to achieve "learning by doing" and "learning by doing", not only to enhance students' professional knowledge, but also to improve personal ability, interpersonal and teamwork skills, engineering systems and decision analysis skills. Students are free to choose according to the cases released by the teacher, and students will conceive and arrange 2 weeks; Each team combined with the selected cases, conducted literature collation and analysis, summarized various factors, methods and strategies of current application, formed a reference list, and discussed preliminary plans (required to submit screenshots of online discussions and analysis of the first draft, and partial discussion and learning were completed in offline classes). Design stage: The overall teaching method is mainly project-based teaching and modular teaching, and the selected cases should be typical, authentic and moderate. According to the ideas of the conception stage, the student team applies the corresponding management methods, such as the Delphi method, etc., combines the current situation of society or situations to discover and summarize problems, and obtains professional

knowledge through search engines, various online courses or resources, online classes, etc., in this process, it is necessary to continuously conduct dialectical discussions on the issues raised, and gradually form a preliminary method to solve the problem, and arrange 3 weeks (it is required to submit screenshots of online discussions and analyze the first draft, complete some discussions and learning in offline classes, and submit a reference list). The realization phase is the core phase of PBCL-CDIO, which is scheduled for 10 weeks, and focuses on the development of students' analytical and problem-solving skills. With the support of wisdom tree and media technology, teachers will release online tasks at this stage, and arrange online learning of corresponding basic knowledge points, and students need to preview and complete online learning before class. Combined with the results of the previous stage, students can apply various qualitative and quantitative methods (such as fsQCA qualitative comparative analysis method, questionnaire survey method, etc.) to analyze, and then propose solutions, while the teams and teachers participate in discussions on this plan to form the final decision-making plan. Operation stage: mainly for the evaluation stage, arranged for 2 weeks, teachers invite non-teaching teachers, industry experts, etc. to evaluate student solutions and put forward suggestions for improvement, and the student team will jointly score on-site with teachers and experts.

3.3 Blended Assessment Method for New Business Courses Based on PBCL-CDIO Model

The assessment method of the PBCL-CDIO model abandons the drawbacks of "emphasizing results over process" in the traditional assessment method, and adopts the assessment method of "whole process, multi-method, and multi-personnel participation" to comprehensively examine students' learning ability, language expression ability, personal communication ability, teamwork ability, planning and design ability, analysis and problem-solving ability, etc. Plan the plan, combine online courses with video learning, online knowledge point quiz and other methods for comprehensive evaluation. The planning scheme adopts multi-person participation. Teachers are organizers and executors of multiple evaluation, which is the core and plays a role in promoting the quality of talent training, so the weight is set higher. The experts outside the school are mainly people in the industry or enterprises, who have rich industry experience. They are the passive subject of student evaluation and play a decisive role in the evaluation. Members in the group and team members master the daily learning and task completion between members and between teams, effectively avoiding free riding, so they are also important members of the evaluation. Thus, the weight of members in the group, members of the team, experts outside the school and teachers is set to 2, 2, 2 and 4.

4 The Effectiveness of the Implementation of the Teaching Reform

Since the fall semester of 2021, this teaching model reform plan has been applied in the accounting (international mutual recognition course program) and business administration major of Bohai University, and the application courses are "Strategic Management" and "Financial Management" respectively, with a total of 199 students, each group consists of 6 students, and the teaching cycle is 17 weeks, with 2 lessons per week and 50 minutes each. All groups of students were able to successfully complete some online and offline learning and tasks.

At the end of the course, 199 students were surveyed to see if the curriculum reform was meeting the corresponding goals. A total of 199 questionnaires were distributed and 199 questionnaires were recovered, with an effective rate of 95.6%. The questionnaire results showed that 83.3% of the students believed that they actively participated in the whole teaching process and had high participation in the course. 90.5% of students think that they check the information, do learning, compared with the simple teacher teaching, the mastery and understanding of knowledge is more profound, the effect is better, expert comments make students really understand how to apply professional knowledge to time, but also further understand the market requirements for talents, help their own practical ability to improve. In summary, the new business course hybrid teaching model based on the PBCL-CDIO model of "one body, two wings and three docking" has been recognized by students in the course teaching.

5 Conclusion

With the deepening of the digital economy, business talents are facing specific challenges in terms of training mode and course construction, and need to be continuously aligned for optimization and improvement, integrating PBCL and CDIO concepts, and combining online teaching such as MOOC, micro-course, learning pass, wisdom tree, DingTalk classroom and offline teaching, which can meet students' needs for the practical application of professional knowledge and enrich the teaching system of business courses. Therefore, in combination with the development of modern society, we should continue to explore in depth, reflect on teaching problems, and propose targeted solutions to meet the development needs of new business majors, enhance students' learning motivation, and truly realize the connection between teaching and practical application.

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