An Exploration of OBE Teaching Practices Driven by Large AI Models

Baojun Fu*, Yu He, Ying Zhou, Xiaojun Guan, Yan Yu

College of Computer Science and Technology, Harbin Engineering University, Harbin 150001, China;
**Corresponding author: teacherfbj@hrbnu.edu.cn*

Abstract: *The Outcome-Based Education teaching philosophy is an educational approach centred on student-focused learning, employing a reverse-engineering methodology to design curriculum frameworks with learning outcomes as the primary objective. However, this pedagogical approach fails to provide sufficiently concrete descriptions of learning outcomes, which leads to misalignment in understanding between teachers and students. Accordingly, we have reconstructed the OBE teaching model under the guidance of large AI models. This model analyses the supportive role of large AI models in the teaching process across three distinct phases: teaching preparation, teaching implementation, and teaching evaluation. It emphasises how students engage in self-directed learning during project-driven teaching implementation, thereby effectively transferring acquired knowledge to practical work scenarios and enhancing their capacity for critical thinking and issue resolution. Finally, a three-dimensional teaching evaluation mechanism has been established to assess and evaluate learning outcomes in a more objective and comprehensive manner. In order to further validate the new teaching model, we implemented pedagogical reforms in the delivery of the Database Applications and Development course for computer science students, achieving commendable educational outcomes.*

Keywords: *AI large models, OBE philosophy, project-driven approach, teaching revolution*

1. Introduction

With the rapid advancement of emerging artificial intelligence technologies, the new generation of large language models represented by ChatGPT, DeepSeek, and Kimi has profoundly impacted diverse industries.[1-2] By employing open-source strategies, multimodal interaction, complex reasoning, and reinforcement learning-driven language construction mechanisms, these large models are reshaping pathways for information acquisition and knowledge generation. Consequently, they are accelerating the digital and intelligent transformation across numerous sectors including education, healthcare, and cultural dissemination. The integration of large AI models into outcomes-based teaching facilitates the construction of knowledge graphs, enabling these models to function as intelligent teaching assistants, personalised learning engines, and human-machine interaction partners. This approach supports educators in refining educational objectives, advancing personalised learning, and innovating teaching methodologies, thereby effectively enhancing pedagogical efficacy.

Outcome-based Education (OBE) is a pedagogical approach centred on the learner, where learning commences from real-world problems within a professional field. It is grounded in anticipated learning outcomes, enabling the instructional process to be designed in reverse.[3] This innovative approach to learning overturns the traditional teaching model centred on knowledge accumulation as measured by grades. It emphasises that the essence of human learning lies in problem-solving, encouraging students to engage in independent, collaborative and inquiry-based learning.[4-5] This fosters a cognitive model focused on tackling challenges, exploring the unknown and learning for the sake of innovation. By integrating AI large-model tools into outcome-oriented curriculum education, teachers can refine the essence of problems within pre-designed application scenarios for students, thereby recognising the root causes of real-world challenges. With the assistance of AI large models, educators can analyse and summarise appropriate approaches to problem-solving, further mastering theoretical knowledge for classroom instruction while enhancing their analytical and problem-solving capabilities.

The OBE teaching model, driven by large AI models, offers an effective means of distilling course content, particularly through the introduction of knowledge graphs that enable students to grasp the core structure of the subject matter.[6] Through comprehensive analysis of learners' individual characteristics and learning profiles, we tailor cognitive approaches to each learner, enabling them to identify, analyse

and resolve problems within their preferred contexts. This facilitates deeper understanding of the root causes of issues, significantly elevating educational quality. Such an approach plays a vital role in advancing educational equity, enhancing teaching standards and optimising educational governance.[7] Guided by the OBE teaching philosophy, we transcend the cognitive logic of mere knowledge accumulation, transforming into collaborative exploration and discovery between humans and AI to solve problems. This fosters an innovation-driven logic centred on problem-solving, which fully mobilises students' initiative and enthusiasm throughout the learning process.

2. The Positive Impact of the OBE Teaching Model Driven by Large AI Models

2.1 Improving the effectiveness of personalised learning for students

The OBE teaching model, driven by large AI models and enhanced by AI-assisted learning capabilities, integrates and analyses learners' behavioural data, knowledge interconnections, and dynamic shifts in learning resources. This delivers a personalised learning experience, enabling precision teaching.

2.2 Cultivating Scientific Thinking Skills

This approach adopts a student-centred perspective to explore in depth the fundamental properties of objective phenomena, their inherent laws, and the connections between them. It cultivates innovative perspectives and competencies by subjecting diverse information, viewpoints, and conclusions to verification and refinement through evidence-based and logical critical inquiry, thereby enhancing students' scientific thinking skills.

2.3 Enhance scientific reasoning skills

This pedagogical approach transforms students from passive recipients of knowledge into active explorers aided by artificial intelligence. Through observing and studying the patterns governing phenomena, they synthesise reasoning, derive effective arguments for problem-solving, and ultimately apply these to resolve challenges. During the process of gradual logical inference, their scientific reasoning skills were enhanced.

2.4 Enhancing scientific reasoning capabilities

The OBE teaching model, driven by large AI models, employs problem reasoning and knowledge extension. When confronted with novel challenges, students can draw upon existing evidence to engage in sound reasoning, logical deduction, and argumentative elimination, thereby arriving at correct conclusions. This process effectively stimulates students' mental agility and enthusiasm for engaging with the problem's conclusions. Through the collision of diverse perspectives, students are inspired to articulate personal viewpoints and challenge opposing arguments with evidence, cultivating the habit of systematically analysing and interpreting research topics from a scientific reasoning standpoint.

2.5 Promoting the implementation of teaching reforms

The introduction of the OBE teaching model, driven by large AI models, has provided new avenues for meeting the demands of both teachers and students for high-quality learning resources and intelligent learning environments.[8] It optimises aspects neglected by traditional experiential education, paving new pathways for the development of personalised teaching. This facilitates pedagogical transformation by integrating AI elements into outcomes-based curriculum models.

3. Implementation Process of Object-Based Education Driven by Large AI Models

The implementation process of teaching constitutes the core and fundamental aspect of educational activities. The integration of large AI models has enhanced operational efficiency across all teaching processes, providing more thorough and flexible decision support, thereby facilitating the transition of teaching implementation towards digital and intelligent transformation.

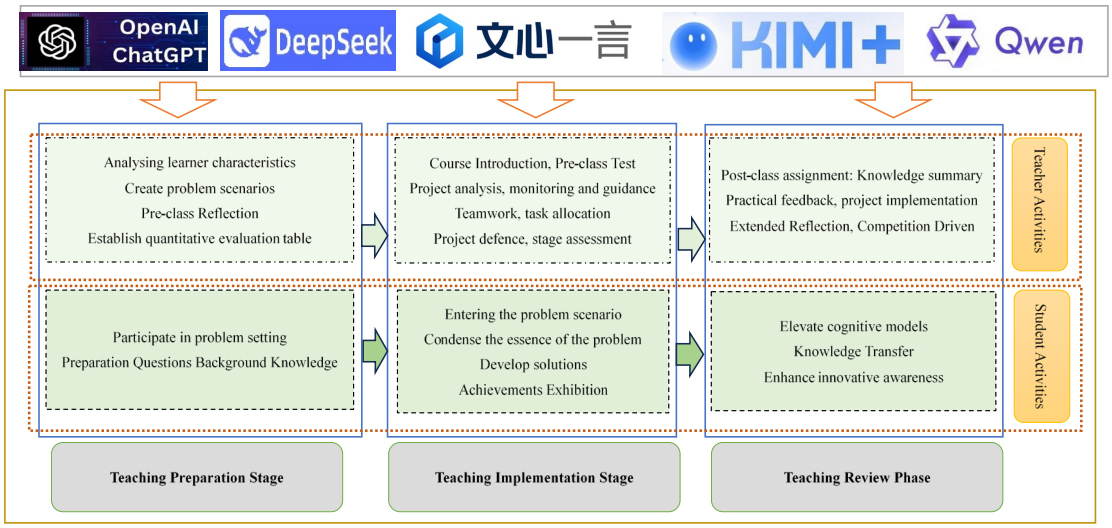

Figure 1: Implementation Process of Object-Based Education Driven by AI Large Models

3.1 During the instructional preparation phase

Students initially engage in outcome and problem formulation under teacher supervision and guidance. They independently undertake background knowledge learning, leveraging AI large models to analyse problem characteristics and functionalities. This facilitates intelligent evolution and intelligent delivery within the teaching process, thereby constructing teaching scenarios that align with learning needs in accordance with the Outcome-Based Education philosophy.

3.2 During the teaching implementation phase

The design of teaching scenarios requires educators to adopt an OBE-guided approach, employing project-driven methods to facilitate students in forming learning teams. These teams shall collaborate to resolve predefined problems, thereby distilling the essence of the issues under investigation. Students engage in self-directed learning through three stages: identifying problems, resolving issues, and synthesising insights within authentic, pre-established scenarios. During this period, teachers are required to guide students' learning through four key stages: creating contextual scenarios, problem-driven approaches, abstract conceptualisation, and transferable application. Educators construct authentic application scenarios, formulating practical problems rooted in classroom theory. Students are then directed to apply appropriate cognitive methodologies-including experimental inquiry, inductive summarisation, theoretical deduction, and analogical analysis-to investigate these problems. Through this process, they abstract core concepts and learn to transfer acquired knowledge to novel workplace contexts, thereby achieving mastery of the subject matter. Because the issues encountered in practical application scenarios involve relatively novel knowledge, although prior courses have provided the necessary foundational teaching, teachers still need to utilise large language models to offer appropriate guidance, prompting, instruction, and assistance to students during the problem-identification and problem-solving stages. This approach stimulates and drives students to develop an outcome-oriented mindset, enhancing their thinking through independent and creative learning, thereby elevating their capacity for critical reflection and problem-solving.

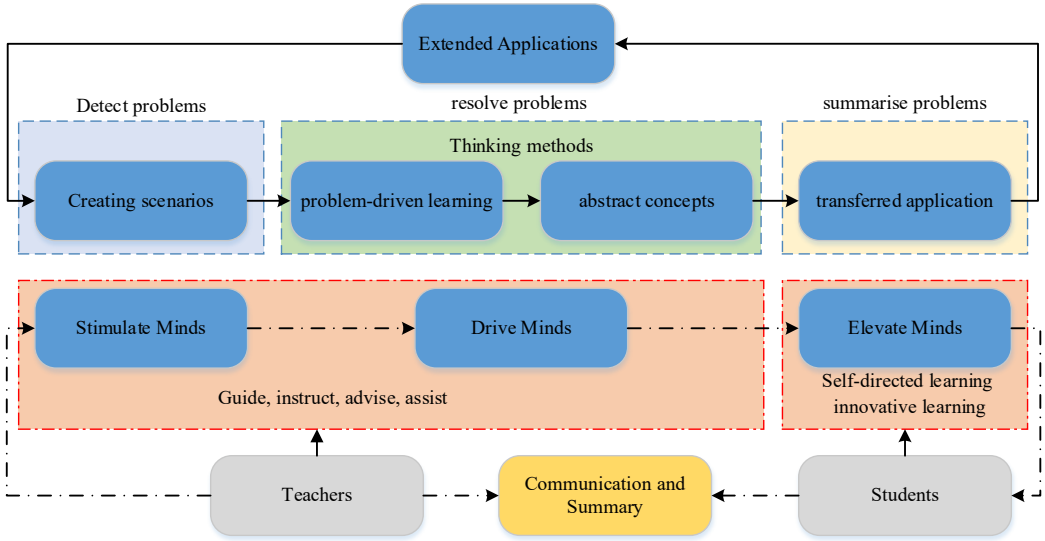

Figure 2: Outcome-Oriented Self-Directed Learning Scenario

In terms of teaching methodology, we have moved away from the traditional "rote learning" approach to instruction. Instead, we employ the BOPPPS teaching model, as illustrated in Figure 3, with the aim of stimulating students' enthusiasm for learning. In order to emphasise the OBE philosophy, teachers guide students to engage in proactive, inquiry-based learning centred around outcomes and driven by tasks, thereby enhancing their initiative and creativity in learning. Teaching methodologies are structured around the course implementation process to construct a knowledge framework. By analysing the essence of knowledge, an intelligent teaching model is established, which encompasses pre-lesson intelligent lesson preparation, precise delivery of teaching content during lessons, and post-lesson intelligent Q&A sessions and tutoring.[9] Additionally, various data generated during the teaching process (including student assignments, group discussion outputs, and learning status videos) are collected and analysed in real time. By integrating data mining and artificial intelligence technologies, the analytical findings are transformed into decision-making bases, which are then fed back into the teaching implementation process. This establishes a knowledge feedback loop, providing support for adjusting teaching methods and pedagogical approaches.

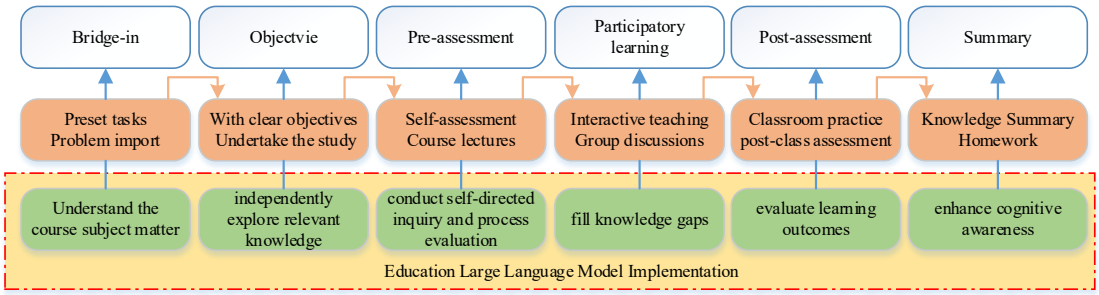

Figure 3: Outcome-Oriented BOPPPS Teaching Model Design

3.3 The teaching summary phase

As the concluding stage of instructional activities, enables students to continue consolidating knowledge through post-lesson assignments, knowledge summarisation, practical feedback, extended reflection, project implementation, and competition-driven initiatives. This facilitates the refinement and transfer of knowledge, fostering the development of innovative thinking.

4. Evaluation of Teaching Effectiveness

The advancement of emerging information technologies is propelling all aspects of teaching towards automation, intelligence and scientification, with particular emphasis on the teaching evaluation process. The OBE teaching evaluation process driven by AI large models focuses on three key dimensions.

4.1 Data-driven personalised assessment

The knowledge graph is employed to model the mastery of diverse knowledge categories during the learning process, alongside collected behavioural data (including facial expressions, movements, and language).[10] It constructs multidimensional profiles for students, enabling differentiated assessment and forming an adaptive scoring model. This dynamically adjusts the weighting of scores for weaker knowledge points.

4.2 Automated assessment and real-time feedback

We integrate with various online teaching platforms (such as Touge and Yuke) to monitor student behaviour in real time, automate the marking of assignments and tasks, and issue real-time learning alerts based on platform performance feedback, thereby delivering personalised remedial recommendations.

4.3 Multimodal data fusion analysis

Employing AI technology to analyse students' facial expressions and vocal engagement within classroom teaching videos, this approach supplements traditional quantitative assessments by generating comprehensive competency radar charts. It enables multidimensional evaluation and analysis of learning outcomes.

In order to validate the effectiveness of the teaching model, we implemented teaching reforms during the delivery of the Database Applications and Development course for the Computer Science programme in the 2025 academic year. During the final assessment process, we incorporated course design projects as an assessment format, evaluating students' project completion across the aforementioned three dimensions. Following a year of teaching implementation, the specific data is presented in Table 1.

Table 1: Comparison of Grade Distributions for Database Applications and Development Course in Computer Science

Grade	The academic year 2024		The academic year 2025	
	Number of persons	Proportion(%)	Number of persons	Proportion(%)
Excellent	15	19.5	20	28.2
Good	25	32.5	15	21.1
Average	21	27.3	33	46.5
Pass	16	20.8	3	4.2

As shown in Table 1, when the AI-driven OBE teaching model was not implemented, the proportion of students achieving average and pass grades was relatively high, at 27.3% and 20.8% respectively. The proportion of outstanding students is relatively low, accounting for 19.5%. Since the implementation of the new teaching model in the 2025 academic year, teaching outcomes have shown marked improvement. The proportion of students achieving average and excellent grades increased significantly during this academic year, rising by 19.2% and 8.7% respectively. Consequently, it is evident that the new teaching model can effectively stimulate pupils' interest in learning, thereby fully mobilising their initiative and enhancing academic performance.

5. Conclusion

Guided by the OBE teaching philosophy, AI large models establish a comprehensive and systematic learning framework for students. The system proceeds from distilled core issues to achieve a deepening and broadening of knowledge from specific points to comprehensive coverage. It accomplishes the integration of fragmented knowledge, forming an effective knowledge map. Students develop excellent cognitive traits through training in analysis and synthesis, abstraction and generalisation, systematisation and concretisation. They master the ability to uncover the essence of phenomena and enhance their capacity for scientific thinking.

AI-driven large-scale models underpin the Outcome-Based Education (OBE) teaching model, which supports the cultivation of computer science students in the new era by enhancing teaching implementation, fostering positive student habits, and evaluating educational outcomes. It provides an effective working approach for enhancing students' innovation, collaboration, and problem-identification and -solving capabilities. Concurrently, this pedagogical approach effectively emphasises an outcomes-based teaching philosophy, placing heightened demands on the learning environment and diverse

learning resources to meet learners' evolving expectations regarding teaching methodologies. The exploration of outcomes-based teaching driven by large AI models holds significant potential for advancing educational innovation and addressing challenges in educational development.

Acknowledgments

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