

Original Research Article

The application of generative AI in BOPPPS teaching: A study on the new interactive ecology of the smart classroom for higher vocational business English

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Abstract: Against the digital transformation of vocational education, this study integrates generative AI (GenAI) and the BOPPPS model to build a new interactive ecology for vocational business English smart classrooms. Adopting a mixed-methods design with 116 business English students, the research verifies that GenAI-assisted BOPPPS teaching significantly improves classroom interaction, student engagement and academic performance, and solves the problems of single interaction, insufficient business scenarios and inadequate personalized guidance. This study constructs a feasible GenAI-BOPPPS framework, providing references for the intelligent reform of vocational business English teaching.

Keywords: generative AI; BOPPPS model; business English; higher vocational education; smart classroom; interactive ecology

1. Introduction

1.1. Research background

Generative AI has profoundly transformed foreign language education. Vocational business English, which focuses on practicality and professional scenarios, is limited by traditional classrooms with single tools, insufficient real business contexts, and low-efficiency interaction, making it hard to cultivate qualified international business talents.

As a widely used student-centered teaching model, BOPPPS still faces problems such as weak introduction, unclear objectives, single assessment, and superficial participation. Generative AI can empower each BOPPPS section to realize intelligent scenario generation, real-time feedback and personalized teaching, thus rebuilding a new interactive ecology for smart classrooms.

1.2. Literature review

Foreign studies focus on GenAI's application in oral English training, writing feedback and scenario simulation, confirming its positive effect on improving learning efficiency. Domestic studies explore the integration of BOPPPS and information technology, but few systematically combine GenAI with the complete BOPPPS process, especially lacking empirical research oriented to higher vocational business English interactive ecology.

1.3. Research questions

- (1) How can generative AI be embedded into each module of BOPPPS to optimize teaching design?
- (2) Can the GenAI-BOPPPS integrated model effectively improve the interactive level and learning effect of vocational business English classrooms?
- (3) What is the construction path of the new smart classroom interactive ecology supported by GenAI?

1.4. Research significance

Theoretically, this study enriches the theoretical system of AI + vocational foreign language teaching and expands the application boundary of BOPPPS model. Practically, it provides a replicable teaching scheme for front-line business English teachers and promotes the high-quality development of intelligent teaching in vocational colleges.

2. Theoretical basis and conceptual connotation

2.1. Theoretical basis

Constructivist learning theory emphasizes knowledge construction through situational cognition and interactive communication, which is consistent with the core logic of BOPPPS participatory learning. GenAI provides diversified situational tools for knowledge construction.

Interactive transmission theory holds that efficient teaching depends on multi-directional and high-quality information interaction. GenAI breaks the limitations of time and space, forming a teacher-student-AI tripartite interactive structure.

Smart education theory points out that AI technology realizes data-driven teaching decision-making and personalized service, which provides methodological guidance for the optimization of BOPPPS assessment and feedback links.

2.2. Core concept definition

Generative AI in Business English Teaching: With functions of scenario generation, oral correction, writing feedback, role-playing and intelligent assessment, it supports the whole teaching process.

BOPPPS Teaching Model: Six modular teaching design including Bridge-in, Objective, Pre-assessment, Participatory Learning, Post-assessment and Summary.

New Interactive Ecology of Smart Classroom: A dynamic and balanced teaching system composed of teachers, students, AI technology, teaching resources and interactive environment, featuring intelligence, personalization, high participation and situationality.

3. Construction of GenAI-BOPPPS integrated teaching model

This study embeds generative AI into six links of BOPPPS and constructs a full-process intelligent teaching model oriented to interactive ecology optimization.

3.1. Bridge-in: AI-generated situational introduction

GenAI generates real-time, industry-based business cases, news materials and video scenarios according to teaching themes, such as cross-border e-commerce disputes, international negotiation dialogues and exhibition reception scenes, replacing traditional PPT introduction and quickly stimulating students' learning interest.

3.2. Objective: AI-assisted visualized target decomposition

Based on students' pre-learning data, GenAI decomposes curriculum objectives into knowledge, ability and literacy dimensions, and generates visualized target descriptions and achievement standards suitable for vocational students' cognitive level, making learning objectives clear and operable.

3.3. Pre-assessment: AI-completed intelligent pre-test

GenAI automatically generates pre-test questions including vocabulary, grammar and business cognition, completes real-time correction and data statistics, identifies students' knowledge weaknesses, and provides data support for teachers' targeted teaching design.

3.4. Participatory learning: AI-supported deep interaction

GenAI undertakes multi-role interactive tasks: business partner in role-playing, dialogue trainer in oral practice, real-time feedback provider in writing training, and group discussion guide. It supports multi-round interaction and instant correction, greatly improving the depth and effectiveness of participatory learning.

3.5. Post-assessment: AI-driven multi-dimensional evaluation

GenAI conducts process evaluation and result evaluation, scoring students' classroom performance, oral output, written tasks and interactive participation, generating personalized evaluation reports and learning suggestions to realize comprehensive and objective assessment.

3.6. Summary: AI-pushed personalized consolidation

According to classroom performance and assessment results, GenAI pushes targeted review materials, expansion resources and extended tasks for different students, forming a closed loop of teaching-learning-assessment-feedback.

4. Empirical research design and implementation

4.1. Research objects

116 sophomores majoring in business English from two higher vocational colleges, divided into experimental group (58 people, GenAI-BOPPPS teaching) and control group (58 people, traditional BOPPPS teaching). There was no significant difference in pre-test scores between the two groups ($P>0.05$).

4.2. Research variables

Independent variable: GenAI-BOPPPS integrated teaching model.

Dependent variables: classroom interaction intensity, learning participation, business English performance, autonomous learning ability.

Control variables: teaching hours, teaching content, teacher level.

4.3. Research tools

Business English proficiency test, classroom interactive observation scale, learning motivation questionnaire, GenAI teaching platform data statistics.

4.4. Implementation process

The experiment lasted 16 weeks. The control group adopted conventional BOPPPS teaching; the experimental group used GenAI tools to assist the whole process of BOPPPS teaching. After the experiment, data were collected and analyzed by SPSS.

5. Data analysis and results

5.1. Analysis of classroom interaction data

The experimental group was significantly higher than the control group in teacher-student interaction, student-student interaction and human-computer interaction frequency, depth and effectiveness ($P<0.01$). GenAI effectively stimulated multi-dimensional interaction and activated classroom atmosphere.

5.2. Comparison of academic performance

The average post-test score of the experimental group was 82.3, while that of the control group was 71.5. The difference was statistically significant ($P<0.001$), indicating that GenAI-BOPPPS significantly improved students' business English application ability.

5.3. Analysis of learning motivation and participation

The questionnaire results showed that the experimental group scored higher in learning interest, participation willingness and autonomous learning awareness than the control group ($P<0.05$). GenAI's personalized guidance and situational interaction enhanced students' learning initiative.

5.4. Student interview results

Most students believed that AI-generated business scenes were realistic, interactive feedback was timely, and personalized resources helped improve learning efficiency, which verified the acceptance and practicability of the model.

6. Construction path of new interactive ecology

Based on empirical results, this study proposes a five-layer GenAI-supported interactive ecology for vocational business English smart classrooms:

- (1) Technology Layer: Establish a professional GenAI platform for scenario creation, feedback and assessment.
- (2) Teaching Layer: Integrate GenAI with BOPPPS for full-process intelligent instruction.
- (3) Interaction Layer: Build a teacher-student-AI interactive system to improve interaction quality.
- (4) Evaluation Layer: Create a data-driven evaluation system for precise and personalized teaching.
- (5) Guarantee Layer: Strengthen teachers' AI literacy to ensure stable operation.

7. Conclusion

This study confirms that integrating GenAI and BOPPPS effectively builds a new interactive ecology for vocational business English smart classrooms. GenAI optimizes teaching design, enriches interaction, and realizes personalized and precise assessment. Empirical results demonstrate that this model significantly improves student engagement and academic performance, solving major problems in traditional teaching. Future research can optimize AI systems and expand its application in business-related fields to deepen the integration of AI and vocational English education.

Fundings

1. Key Project of Research and Practice on Education and Teaching Reform Project Approved in the Second Batch of the 2024 Teaching Quality and Teaching Reform Project of Guangdong Innovative Technical College "Research on Optimization of Interactive Strategies in Intelligent Classrooms of Higher Vocational Business English Empowered by AI+BOPPPS" (JGZD202406).
2. 2025 Annual Project of the Special Committee on Teaching Quality Management of Private Colleges and Universities, Guangdong Higher Education Teaching Management Association "Research on Optimization of Interactive Strategies in Intelligent Classrooms of Higher Vocational Business English Empowered by AI+BOPPPS"(GDZLGL25094).

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