Original Research Article

Interactive strategies and students' core literacy cultivation based on AI + BOPPPS in business English smart classrooms for higher vocational colleges

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Abstract: Against the intelligent transformation of vocational education, this paper constructs AI+BOPPPS interactive strategies for vocational business English smart classrooms to explore their impact on students' core literacy. A 16-week quasi-experiment was conducted on 124 students. Results show that the integrated model significantly improves classroom interaction, learning participation, academic performance and four core literacy dimensions. This study provides a replicable intelligent teaching scheme and references for the digital reform of vocational business English education.
Keywords: AI; BOPPPS model; business English; smart classroom; interactive strategies; core literacy; vocational education

1. Introduction

1.1. Research background

Smart education has driven vocational education digitalization. Vocational business English, focusing on practical competence, faces challenges in traditional classrooms: limited interaction, insufficient real scenarios, delayed feedback, and lacking personalization, hindering core literacy development. As a standardized design framework, BOPPPS, coupled with AI's strong scenario generation and interactive capabilities, enables precise teaching empowerment. Integrating AI and BOPPPS in smart classrooms reconstructs interactive mechanisms and optimizes literacy cultivation paths, becoming a critical trend in vocational business English reform.

1.2. Literature review

Existing studies verify the effectiveness of BOPPPS and smart classroom technologies. AI research in foreign language education mainly focuses on language skills training. However, few studies systematically integrate AI, BOPPPS and smart classrooms to design vocational business English interactive strategies, nor do they link interactive teaching to core literacy cultivation. This study fills the gap and supports intelligent teaching reform.

1.3. Research questions

(1) What effective interactive strategies can be formed by integrating AI and BOPPPS in vocational business English smart classrooms?

(2) How do the AI + BOPPPS interactive strategies promote the cultivation of students' core literacy?

(3) What practical implications can be provided for the intelligent teaching reform of vocational business English?

2. Theoretical basis and conceptual framework

2.1. Constructivist learning theory

Constructivism holds that learning is an active knowledge construction process based on real situations and multi-dimensional interactions. AI + BOPPPS interactive teaching creates immersive business scenarios and diversified interactive activities, supporting students to construct language knowledge and professional competence in practice.

2.2. Smart education theory

Smart education emphasizes data-driven, personalized and intelligent teaching services. In smart classrooms, AI technology realizes real-time data collection, precise learning diagnosis and adaptive resource push, providing technical support for efficient interaction and personalized teaching.

2.3. Core literacy of vocational business English

The core literacy of vocational business English includes four core dimensions: cross-cultural communication competence, professional application ability, critical thinking ability and cooperative innovation spirit. These literacy indexes are consistent with the talent training requirements of vocational education and can be effectively cultivated through designed interactive teaching activities.

2.4. AI + BOPPPS + smart classroom framework

This study constructs an integrated teaching framework with BOPPPS as the main structure, AI as technical support and smart classroom as environmental carrier. The framework connects interactive strategies with core literacy training objectives, forming a closed-loop teaching system of "design-implementation-evaluation-optimization".

3. Design of AI + BOPPPS interactive strategies in smart classrooms

3.1. Bridge-in: AI-driven situational introduction strategy

AI generates real-time, industry-based business cases, video scenarios and cross-cultural dialogues covering international trade, business negotiation and cross-border e-commerce. Rich situational introduction quickly stimulates students' learning interest and lays a foundation for interactive learning and cross-cultural awareness cultivation.

3.2. Objective: Visualized hierarchical guidance strategy

Based on pre-learning data, AI decomposes teaching objectives into knowledge, ability and literacy levels, and presents visualized and operable objective standards. Clear learning objectives guide students' autonomous learning and enhance learning directionality.

3.3. Pre-assessment: intelligent diagnosis strategy

AI automatically generates pre-test questions covering vocabulary, grammar and business cognition, completes real-time correction and data analysis, identifies students' knowledge weaknesses and provides data support for differentiated interactive teaching design.

3.4. Participatory learning: Multi-dimensional deep interaction strategy

Three interactive modes are constructed: human-computer interaction for oral role-play, student-student interaction for group cooperative tasks, and teacher-student interaction for targeted guidance. The multi-dimensional interaction enhances students' participation, critical thinking and cooperative communication ability.

3.5. Post-assessment: Multi-dimensional intelligent evaluation strategy

AI conducts comprehensive evaluation from classroom performance, language output, task completion and interactive participation, generates objective evaluation reports and provides real-time feedback for teaching improvement.

3.6. Summary: Personalized consolidation strategy

According to individual learning performance, AI pushes targeted review materials and extended tasks to help students consolidate knowledge, improve autonomous learning ability and form a complete teaching closed loop.

4. Empirical research design

4.1. Research objects

The research selects 124 sophomore business English students from two higher vocational colleges, divided into experimental group (62 students) and control group (62 students). Independent sample t-test shows no significant difference in pre-test scores between the two groups ($p > 0.05$), ensuring the validity of the experiment.

4.2. Research variables

Independent variable: AI + BOPPPS integrated interactive teaching mode in smart classrooms.

Dependent variables: classroom interaction quality, academic performance, core literacy level.

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

4.3. Research methods

This study adopts a mixed research method including quasi-experiment, classroom observation, questionnaire survey and academic test, to ensure the objectivity and accuracy of data collection and analysis.

4.4. Implementation process

The experiment lasts 16 weeks. The control group adopts traditional BOPPPS teaching, while the experimental group implements AI + BOPPPS interactive strategies in smart classrooms, including situational introduction, intelligent diagnosis, multi-dimensional interaction and personalized evaluation.

5. Data analysis and results

5.1. Comparison of academic performance

The post-test average score of the experimental group is 83.17, while that of the control group is 71.42. The difference is statistically significant ($p < 0.01$), indicating that AI + BOPPPS interactive strategies effectively improve students' business English application ability.

5.2. Analysis of classroom interaction quality

Classroom observation data shows that the experimental group is significantly higher than the control group in interaction frequency, participation rate, response quality and thinking depth ($p < 0.001$). The integrated strategy significantly activates classroom atmosphere and improves interaction quality.

5.3. Comparison of core literacy cultivation

The experimental group scores significantly higher than the control group in cross-cultural communication, professional application, critical thinking and cooperative innovation ($p < 0.05$). The results prove that AI + BOPPPS interactive strategies have a significant promoting effect on core literacy development.

5.4. Learning satisfaction survey

Questionnaire results show that more than 90% of students in the experimental group believe that AI-assisted interactive teaching improves learning interest, practical ability and autonomous learning awareness, with high recognition and satisfaction.

6. Interactive strategies for core literacy cultivation

6.1. Situational interaction for cross-cultural communication competence

Real business scenarios created by AI help students perceive cultural differences, understand cross-cultural communication norms and improve cross-cultural expression and adaptation ability.

6.2. Task-based interaction for professional application ability

Professional tasks such as business negotiation, email writing and customer communication enhance students' ability to use English flexibly in real work scenarios.

6.3. Inquiry interaction for critical thinking

Open business cases provided by AI guide students to independently analyze, judge and solve problems, forming rational thinking and problem-solving ability.

6.4. Collaborative interaction for cooperative innovation spirit

Group discussion and project tasks supported by AI promote students' communication and cooperation, stimulate innovative thinking and cultivate team awareness.

7. Conclusion

This study confirms that AI + BOPPPS interactive strategies can effectively optimize classroom interaction and promote core literacy cultivation in vocational business English smart classrooms. The integrated model solves the problems of single interaction, insufficient scenarios and weak personalization in traditional teaching, and significantly improves students' learning performance and comprehensive literacy. In the future, AI technology can be further optimized and applied in more business majors to promote the deep integration of intelligent technology and vocational foreign language 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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