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Research on the Application of Prompt Design in Digital Lesson Preparation for High School English Teachers

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Abstract: *The rapid evolution of generative AI has deepened the integration of large language models (LLMs) into education, particularly in enhancing lesson preparation efficiency. This study investigates the use of the Chinese LLM DeepSeek in high school English lesson planning, taking Family Matters: Just a Brother as a case. Grounded in the BOPPPS teaching model and the BROKE prompt framework, it proposes a prompt-based application model to optimize teacher–AI interaction for high-quality instructional design. Through case analysis and theoretical discussion, the study highlights DeepSeek's advantages in content generation, linguistic adaptation, and digital literacy enhancement, offering practical strategies to advance human–AI collaborative teaching.*

Keywords: *Generative Artificial Intelligence (AIGC), DeepSeek, BOPPPS Teaching Model, BROKE Prompt Framework, Prompt Design, Digital Lesson Preparation*

1. Introduction

The rapid advancement of generative artificial intelligence has emerged as a defining trend of the era, underscoring the co-evolution of human development and technological innovation[1]. China has promoted artificial intelligence (AI) as the focus of the national education strategy. As stated in the "Plan for Building a Powerful Education Country (2024-2035)", the plan relies on knowledge maps, large-scale education models and intelligent technologies to promote digital upgrades of courses, textbooks and teaching methods. AI is expected to penetrate all aspects of learning and achieve the harmonious integration of technology and humanities. Based on this direction, Wen Qiufang (2024) proposed a four-dimensional curriculum framework (see Figure 1), introducing AI beyond the traditional iron triangle of teachers, learners and textbooks, and positioning it as a booster and bridge for innovative teaching. Although Generative AI has outstanding performance in language understanding, reasoning, and multimodal data processing [2,3], its lesson preparation effectiveness still relies heavily on the quality of prompt words. In practice, English teachers often fall into the dilemma of time-consuming and inefficient lesson preparation (Dai, 2023), and most people lack the digital literacy to effectively control AI [4]. In order to solve these problems, this study takes "Family Matters: Just a Brother" as a case study, and uses the DeepSeek model, the BOPPPS teaching framework and the BROKE prompt design method to explore how AIGC reduces the burden and inefficiency of high school English lesson preparation, and systematically analyzes the use mechanism and development prospects of prompt words in digital lesson preparation.

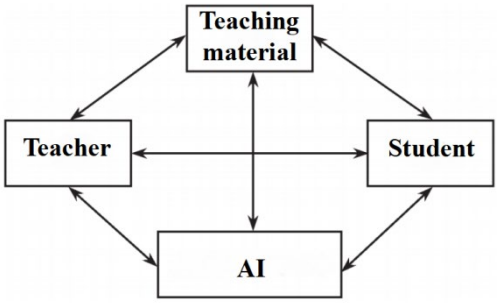

Figure 1 The Four-Element Curriculum Model (Wen, 2024)

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2. Logic and Principles of Prompt Design Model

2.1 Construction Logic of Prompt Design Models

The BOPPPS teaching model, grounded in constructivist and communicative approaches, is a widely recognized instructional design framework emphasizing effective teaching and a closed-loop process that promotes student engagement and feedback [5]. Based on the natural limitation that human attention spans approximately 15 minutes, the model segments classroom content into multiple teaching units of about 15 minutes each. Each unit follows a coherent narrative structure ("introduction, development, transition, conclusion"), and the combination of units also adheres to this overarching structure [6]. Specifically, BOPPPS divides classroom instruction into six core stages: Bridge-in, Objective, Pre-assessment, Participatory Learning, Post-assessment, and Summary. Compared with traditional instruction, this model synergistically improves teaching effectiveness, efficiency, and outcomes.

The BROKE prompt design framework, based on the OKR (Objectives and Key Results) methodology, aims to enhance work efficiency and quality through structured prompt design. It comprises five components: Background—providing sufficient contextual information for LLMs to understand the problem; Role—defining a specific role for the LLM to generate responses accordingly; Objectives—clarifying the task goals for the LLM; Key Results—specifying measurable outcomes to guide the LLM in assessing goal completion; and Evolve—iteratively testing and optimizing outputs. Rather than a static framework, BROKE operates as a dynamic process that continuously refines prompt design and output through experimentation. Integrating BOPPPS with BROKE in prompt-driven instructional design aligns with the TPACK framework by combining Technological Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (PCK), thereby meeting the framework's call for the integration of technology, pedagogy, and subject content.

Secondly, the Competency Integration Logic. On November 30, 2022, the Ministry of Education officially released the Teacher Digital Literacy industry standards, providing guidance for the development of teachers' digital competencies [7]. In 2024, UNESCO published the AI Competency Framework for Teachers [8], which defines teachers' AI values, knowledge, skills, and practical application abilities across five dimensions: human-centered AI concepts, AI ethics, AI foundational knowledge and application skills, AI integration with pedagogy, and AI-supported professional development. The framework also describes competency progression through three levels: acquisition, deepening, and creation.

Based on these dual frameworks, the model emphasizes the following core objectives:

Technological Integration Competency: Drawing on the "digital application" and "digital technology knowledge and skills" dimensions from Teacher Digital Literacy and the AI foundational knowledge and application skills dimension from UNESCO's framework, teachers' ability to design instructional plans using digital technology is enhanced, thereby empowering and improving lesson design and teaching practice.

Collaborative Educational Competency: Individual teachers exhibit varying levels of AI literacy and digital skills, and both prompt design and output optimization involve technical challenges. Embedding large language models (e.g., DeepSeek) within teaching communities such as lesson preparation groups establishes a collaborative mechanism of "collective co-creation—resource sharing—experience exchange," which is crucial for sustaining DeepSeek-assisted lesson preparation. By constructing a "Teacher–DeepSeek–Lesson Preparation Group" triadic structure to create a smart lesson preparation ecosystem, specific strategies include:

Collective Prompt Design: Teachers collaboratively design prompts in group meetings, focusing on pragmatic logic, task objectives, and output requirements.

Task Division and Coordination: AI serves as a "collaborative partner" to allocate preparation tasks, e.g., one teacher handles text analysis, another task creation, and another fine-tuning feedback.

Cross-Validation Mechanism: Multiple teachers use the same prompt to verify the stability, applicability, and scalability of AI outputs, enhancing prompt transferability.

Prompt Sharing and Case Archiving: Refined prompts and their AI-generated outputs are incorporated into the "DeepSeek+ Smart Lesson Preparation Case Repository," accumulating experience assets within the preparation group and forming a knowledge base.

Simultaneously, this approach integrates the Professional Development dimension of Teacher Digital

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Literacy, emphasizing collaborative learning and experience sharing, and aligns with UNESCO's AI framework on AI-supported professional development. Together, these strategies foster collective digital lesson preparation competencies, support innovative teaching research within teacher groups, and enhance individualized learning design under the guidance of generative AI technologies.

2.2 Principles for Constructing Prompt Design Patterns

Template-based prompt design provides support for operability, transferability, and evaluability. Operability refers to the need for the pattern to offer a clear prompt structure and step-by-step instructions, lowering the threshold for teacher use and standardizing teacher behavior. Transferability means the pattern should be applicable across various English teaching scenarios: according to language knowledge objectives, it can be divided into pronunciation, grammar, and vocabulary lessons; according to skill development goals, into listening and speaking, reading, and writing lessons; according to the teaching process, into lecture-practice lessons, consolidation lessons, review lessons, test lessons, and test analysis lessons. Evaluability refers to the requirement that the output results should be observable and assessable in terms of teaching appropriateness and generative quality standards. Since prompts specify tasks, selecting an appropriate prompt template not only greatly affects accuracy but also significantly influences the model's initial task execution [9]. Therefore, as a "bridge" between teachers and large language models, the design logic and linguistic precision of prompts determine the quality and usability of the generated instructional designs. Currently, countries worldwide generally face challenges in developing teacher digital literacy, such as weak motivation for improving digital literacy, suboptimal training programs, difficulty in accurately assessing digital literacy levels, and insufficient integration of digital skills with teaching [10]. Teachers with insufficient digital skills, especially without prior experience, may encounter difficulties in constructing prompts, leading to structural confusion and unclear expression. In response, this study proposes a "template-supported pathway for prompt design," aiming to modularize, systematize, and structure prompt design, making it a reusable, transferable, and optimizable digital teaching tool for teachers.

Conversational prompt optimization provides support for interactivity, plasticity, and inspiration. One of the core advantages of generative AI lies in its "conversational" and "iterative" nature. DeepSeek allows teachers to continuously optimize content output through multi-turn dialogues. This process requires teachers to possess critical thinking skills to objectively evaluate AI outputs, identify potential biases and errors, design counterfactual prompts, test AI comprehension depth, and establish verification mechanisms to ensure output reliability (DeepSeek: From Beginner to Mastery, School of Journalism and Communication, Tsinghua University). This feature also offers teachers an efficient "generate–feedback–regenerate" interactive feedback loop, greatly enhancing the refinement and personalization of lesson preparation, while cultivating teachers' digital awareness and critical thinking. This principle emphasizes the teacher's role as a "human-AI co-creator," enhancing the personalization of instructional design and promoting the accumulation of prompt design experience and generative AI interaction strategies through multi-turn feedback, thereby fostering professional digital growth, digital literacy awareness, and technical skills. The greatest value of generative AI lies not in the answers themselves but in the teacher's process of clarifying and articulating their instructional intentions through dialogue with the large language model. This principle reflects the critical transition from lower-level "tool use" to higher-level "human-AI collaboration."

Embedding AI education ethics provides support for normativity, fairness, and sustainability. Educational ethics refers to the norms and guidelines governing human interactions in educational activities. As a historical category, it must be discussed within the specific educational ecosystem of a given historical stage [11]. Therefore, AI education ethics primarily emerge from the construction of the AI-powered educational ecosystem. In the process of reconstructing the educational ecosystem, AI assumes some human roles, altering interpersonal relationships and prompting discussion on new norms for human-human, human-AI, and AI-AI interactions, thereby forming AI education ethical issues. However, with rapid AI development and insufficient rational awareness among stakeholders, alienated technology begins to dominate human life. In education, this manifests as excessive focus on the value of technological tools while neglecting educational and human development values, with the ability to control technology lagging behind its pace of development, leading to ethical risks in educational applications [12]. Therefore, grounded in a "human development" educational philosophy and adhering to a "people-centered" value orientation, critical reflection on the future application of AI in education is essential. Ethical guidelines emphasizing educational equity, inclusivity, and prudent decision-making can help navigate the value dialogue between "human teaching" and "technological tools," promoting the co-existence of educational rationality and technological rationality while balancing human needs

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with technological development. This principle aligns with the "people-centered thinking" and "AI ethics" dimensions of the Teacher AI Competency Framework, enhancing teachers' ethical decision-making, critical evaluation, and algorithmic risk awareness in human-AI collaborative contexts.

3. Example of Prompt Design Patterns

To present the application process of DeepSeek in high school English instructional design in a clear and systematic way, and to demonstrate the operability of AI technology (DeepSeek) in teachers' lesson preparation practices, the author, based on prior research and personal practice, proposes a digital teaching design model for teachers. This model integrates the BOPPPS classroom teaching framework with the BROKE prompt design framework, aiming to construct a "DeepSeek + Teacher Lesson Preparation" workflow that is operable, transferable, and scalable.

In this model, each BOPPPS teaching stage is not an isolated prompt generation step. Instead, it combines multiple elements from the BROKE prompt design framework to ensure that prompts align with teaching logic, address teaching context, learning objectives, and evaluation requirements, providing high school English teachers with a structured, logically coherent, and practice-oriented DeepSeek + instructional design example (see Table 1).

Table 1 Example of Integrating BOPPPS Teaching Process with BROKE Prompt Design

Teaching Process (BOPPPS)	Teaching Objective	Corresponding BROKE Elements	Example
Bridge-in	Activate background knowledge, stimulate interest, connect to students' real-life experiences	B (Background) + R (Requirement) + K (Knowledge)	"I am a high school English teacher. My students already have basic vocabulary knowledge on the topic of 'family' and 'siblings.' Please design a lesson introduction that activates their life experiences through questions or activities, introduces the theme of the reading lesson Just a Brother, and establishes an emotional connection with their personal experiences." (Teaching text attached)
Objective	Set multidimensional learning objectives (cognitive + skills + affective)	R (Requirement) + O (Objective) + K (Knowledge)	"Based on the textbook content Just a Brother and the high school English curriculum standards, specify three-dimensional objectives: 1) Students can identify character relationships; 2) Understand the text's main ideas and emotions; 3) Improve expressive ability on the topic of family. Generate a corresponding teaching objective statement."
Pre-assessment	Check prior knowledge and identify learning starting points	K (Knowledge) + E (Evaluation) + R (Requirement)	"Design a short pre-class assessment task to evaluate whether students have mastered relevant family-related vocabulary and sentence patterns for describing emotions, and assess their reading readiness for this lesson."
Participatory Learning	Organize interactive activities to internalize and transfer knowledge	K (Knowledge) + R (Requirement) + E (Evaluation) + O (Objective)	"Design two interactive learning activities related to the Just a Brother text, such as role-play or debate. Activities should focus on character emotional development and family conflicts, with formative assessment criteria to help students construct an understanding of family relationships."
Post-assessment	Evaluate achievement of learning objectives and provide feedback	E (Evaluation) + O (Objective) + K(Knowledge)	"Design an end-of-lesson assessment task based on the learning objectives, which can take the form of group presentations, writing, or Q&A. Focus on whether students grasp the text's main ideas, emotional changes, and relevant expression patterns."
Summary	Consolidate key points, achieve knowledge transfer and value guidance	O (Objective) + K (Knowledge) + E (Evaluation) + B (Background)	"Design a lesson summary task guiding students to review the protagonist's emotional changes in Just a Brother, connect it to their own family experiences through oral sharing or writing, and reflect on the value and importance of family relationships."

4. Conclusion and Reflection

This study, grounded in AIGC technology, addresses the practical needs of high school English teachers' lesson preparation by leveraging the DeepSeek-R1 model. It proposes and constructs a dual-model framework "BOPPPS + BROKE", exploring how teachers can achieve deep interaction with large language models (DeepSeek-R1) through structured prompt design, enhance their willingness to engage with digital tools, deepen human-AI collaboration skills, and comprehensively improve individual digital literacy.

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At the same time, this research expands the application of TPACK theory in the era of generative AI by incorporating prompt design capability into the teacher digital literacy framework. This provides a theoretical basis for updating and evolving the TPACK model, offers a new practical pathway for enhancing contemporary teacher digital literacy, and supports high school English teachers in achieving deep integration of professional knowledge and technological skills under the "AI + education" paradigm. The construction of the "BOPPPS + BROKE" model enriches the "Teacher–AIGC (DeepSeek)–Lesson Preparation Team" triadic interaction mechanism in AI + education research, actively responds to Wen Qiufang's proposed "Four-element New Curriculum Model", and fills the theoretical gap in teacher prompt design strategy research and input optimization pathways. It provides frontline high school English teachers with a logically clear and operationally simple guide for prompt design and lesson preparation, facilitating the use of DeepSeek in classroom planning.

By standardizing the linguistic structure of prompts through the BROKE model, the study ensures accuracy of information input and quality of output between teachers and DeepSeek, strengthens teachers' digital awareness and digital language expression ability, promotes intelligent lesson preparation transformation and collaborative mechanism construction within teacher teams, and provides practical support for building a digital collaboration platform in regional teacher development communities.

Despite these contributions, the study has several limitations:

Limited research samples and case applications. The study primarily focuses on the reading text Just a Brother from the third unit of the first-year high school English curriculum by Foreign Language Teaching and Research Press, and has not yet addressed other grade levels (e.g., elementary, middle school) or other lesson types (e.g., writing, listening and speaking classes).

Lack of systematic empirical intervention research. Although the dual-model framework has theoretical and operational value, it has not been widely validated in actual lesson preparation environments, and lacks dynamic quantitative evaluation of improvements in teachers' prompt design competencies.

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