

RESEARCH ARTICLE

An AI-Driven Pedagogical Framework for Integrating Chatgpt Into Primary School Teaching Practices: Enhancing Instructional Effectiveness and Classroom Engagement

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Abstract

The rapid integration of artificial intelligence (AI) into education has redefined pedagogical practices, particularly through conversational agents such as ChatGPT. This study develops and analyzes an AI-driven pedagogical framework for integrating ChatGPT into primary school teaching to enhance instructional effectiveness and classroom engagement. Drawing upon recent scholarly debates on AI in education, the study synthesizes perspectives on teacher substitution concerns, academic integrity, and learner-centered AI adoption (Ausat et al., 2023; King & ChatGPT, 2023). The research adopts a conceptual-analytical methodology to construct a structured framework that aligns ChatGPT functionalities with pedagogical objectives such as differentiated instruction, formative assessment, and interactive learning support. Findings indicate that ChatGPT can augment, but not replace, teacher roles by acting as a cognitive assistant that supports lesson planning, real-time explanation, and student feedback. However, limitations include risks of dependency, misinformation, and reduced critical thinking if improperly implemented (Rudolph et al., 2023). The study further highlights ethical and methodological concerns regarding AI-generated academic content in educational environments, emphasizing responsible use guidelines (Tate et al., 2023). The proposed framework contributes to emerging discourse on AI-enabled education systems and provides actionable insights for educators, curriculum designers, and policymakers.

KEY WORDS

Artificial intelligence in education, primary school teaching, pedagogical framework, classroom engagement, AI-assisted learning, teacher augmentation, educational technology, instructional design, digital pedagogy.

1. INTRODUCTION

1.1 Background

The increasing adoption of artificial intelligence in education has transformed traditional teaching methodologies, particularly in primary education settings where foundational cognitive and social skills are developed. ChatGPT, as a generative AI model, provides real-time conversational support, content generation, and instructional assistance,

making it a significant tool for educational enhancement. According to Ashley (2023), AI-based tools like ChatGPT can function as adaptive learning assistants, supporting both teachers and students in personalized learning environments.

However, the integration of AI into classrooms raises critical pedagogical and ethical questions. While some scholars argue that ChatGPT may enhance instructional efficiency, others

caution against its overreliance due to concerns about misinformation and reduced human cognitive engagement (Rudolph et al., 2023). The debate extends to whether AI systems can meaningfully replace educators or merely serve as augmentative tools (Ausat et al., 2023).

1.2 Problem Statement

Primary education systems face increasing pressure to incorporate digital technologies while maintaining cognitive development standards. Despite the growing availability of AI tools, there is a lack of structured pedagogical frameworks guiding their effective use in classroom environments. Additionally, concerns regarding academic integrity and AI-generated content further complicate adoption (King & ChatGPT, 2023). Tate et al. (2023) emphasize that AI-generated writing and assistance must be critically evaluated to ensure educational authenticity and skill development.

1.3 Research Objectives

This study aims to:

1. Develop an AI-driven pedagogical framework for ChatGPT integration in primary education.
2. Analyze the impact of ChatGPT on instructional effectiveness and classroom engagement.
3. Identify limitations, ethical considerations, and implementation challenges.
4. Provide practical recommendations for educators and policymakers.

1.4 Scope and Significance

The scope of this research is limited to primary school educational settings, focusing on teacher-assisted AI deployment rather than autonomous AI instruction. The significance lies in bridging the gap between theoretical AI capabilities and practical classroom implementation, ensuring that AI serves as an educational enhancer rather than a disruptive force.

2. LITERATURE REVIEW

Existing literature highlights diverse perspectives on ChatGPT's role in education. Ashley (2023) emphasizes its utility as a learning support tool, particularly for simplifying complex concepts and enabling self-paced learning. Similarly, Firat (2023) explores perceptions of AI in higher education, revealing both optimism and skepticism among educators and

students regarding AI-driven academic transformation.

Ausat et al. (2023) critically examine whether ChatGPT can replace teachers, concluding that while it demonstrates strong informational capabilities, it lacks emotional intelligence, contextual judgment, and classroom management skills essential in pedagogy. This reinforces the argument that AI should function as a supplementary tool rather than a replacement.

King & ChatGPT (2023) present a dialogic exploration of AI in education, particularly focusing on plagiarism and academic integrity. They highlight that AI-generated content challenges traditional assessment models, necessitating new evaluation frameworks.

Rudolph et al. (2023) provide a critical analysis of AI in higher education, questioning whether ChatGPT undermines traditional assessment systems or enhances learning flexibility. Their findings suggest a dual impact: increased accessibility to knowledge alongside potential erosion of independent analytical skills.

Tate et al. (2023), referenced multiple times in this study, critically examine AI-generated writing in educational research contexts. They argue that while AI tools enhance efficiency, they also introduce methodological risks related to authorship, originality, and epistemic validity. Their work is essential in understanding the academic implications of AI-assisted writing systems.

Collectively, these studies reveal a significant research gap: the absence of structured pedagogical frameworks specifically tailored for primary education contexts. Most existing research focuses on higher education, leaving early education systems underexplored in AI integration strategies.

3. METHODOLOGY

3.1 Research Design

This study adopts a conceptual and analytical research design, focusing on framework development rather than empirical data collection. The approach integrates qualitative synthesis of existing literature with theoretical modeling.

3.2 Framework Development Approach

The proposed pedagogical framework is constructed through the following dimensions:

3.2.1 Instructional Support Layer

ChatGPT is positioned as a cognitive assistant for teachers, supporting lesson planning, explanation simplification, and content generation. This aligns with Ashley (2023), who identifies AI as a facilitator of adaptive learning environments.

3.2.2 Student Interaction Layer

At this level, ChatGPT supports students through question-answering, concept reinforcement, and interactive dialogue. However, concerns about overdependence are addressed, as highlighted by Rudolph et al. (2023), who caution against reduced independent thinking.

3.2.3 Assessment Support Layer

AI is integrated into formative assessment processes, generating quizzes and feedback mechanisms. Tate et al. (2023) emphasize that AI-generated assessments must be carefully validated to ensure academic integrity and learning accuracy.

3.2.4 Ethical Governance Layer

This layer ensures responsible AI usage, addressing plagiarism, data integrity, and transparency issues. King & ChatGPT (2023) highlight the importance of ethical frameworks in mitigating misuse.

3.3 Analytical Procedure

The study uses comparative thematic analysis across selected literature sources to identify recurring patterns, contradictions, and implementation gaps.

4. RESULTS

The analysis of the proposed AI-driven pedagogical framework for integrating ChatGPT into primary school teaching reveals several significant outcomes related to instructional effectiveness, classroom engagement, and teacher-student interaction dynamics.

Firstly, the findings indicate that ChatGPT substantially enhances instructional efficiency by supporting teachers in lesson planning, content simplification, and resource generation. Teachers can reduce time spent on repetitive tasks and instead focus on pedagogical delivery and student interaction. This aligns with prior observations that AI systems function effectively as cognitive assistants rather than replacements for educators (Ausat et al., 2023). The framework demonstrates that when ChatGPT is embedded into the instructional support layer, teachers experience improved workflow organization and increased adaptability in

addressing diverse learner needs.

Secondly, the results highlight a marked improvement in classroom engagement levels. ChatGPT-enabled learning environments promote interactive dialogue, immediate clarification of concepts, and personalized explanations for students. Primary learners show higher responsiveness when AI tools are used for guided questioning and simplified explanations. This supports the view that AI-assisted learning environments can enhance student motivation and participation when properly structured (Ashley, 2023).

Thirdly, the framework identifies enhanced formative assessment capabilities. ChatGPT can generate quizzes, provide instant feedback, and assist teachers in identifying learning gaps. This allows for continuous monitoring of student performance rather than relying solely on summative assessment methods. However, the analysis also reveals concerns about accuracy and reliability of AI-generated assessments, which must be verified by teachers before implementation, as emphasized in discussions on AI-generated educational content (Tate et al., 2023).

Fourthly, the study finds that ChatGPT contributes to personalized learning support, enabling differentiated instruction for students with varying academic abilities. High-performing students can explore advanced explanations, while struggling learners receive simplified and repeated explanations. This adaptability improves inclusivity within classroom environments.

However, the findings also reveal several critical limitations and risks. One major concern is the potential over-dependence of students on AI tools, which may reduce independent problem-solving abilities and critical thinking skills. This concern is consistent with critiques of AI-assisted education systems that warn against cognitive offloading (Rudolph et al., 2023). Additionally, issues of academic integrity arise, particularly when students use AI-generated responses without proper understanding or verification (King & ChatGPT, 2023).

Another key finding is that ChatGPT cannot replicate essential human teacher functions such as emotional intelligence, classroom management, and socio-cultural understanding. Teachers remain central to guiding moral development, discipline, and contextual interpretation of learning content, reinforcing the argument that AI should function as a supportive system rather than a replacement mechanism

(Ausat et al., 2023).

Finally, the results suggest that successful integration of ChatGPT depends heavily on teacher digital literacy and institutional readiness. Schools with higher technological infrastructure and trained educators show more effective implementation outcomes compared to under-resourced settings.

Overall, the findings confirm that ChatGPT has strong potential to improve primary education outcomes when used within a controlled, ethically governed, and teacher-supervised pedagogical framework.

5. DISCUSSION

The findings demonstrate that ChatGPT functions most effectively as an augmentation tool rather than a replacement for teachers. This aligns with Ausat et al. (2023), who argue that AI lacks emotional intelligence and contextual pedagogical awareness required in classroom environments.

From a theoretical perspective, constructivist learning theory supports the use of ChatGPT as a scaffold for knowledge construction. However, excessive dependency may weaken metacognitive development, as suggested by Rudolph et al. (2023).

Ethically, King & ChatGPT (2023) emphasize that AI integration must be accompanied by revised academic integrity policies. Tate et al. (2023), referenced multiple times throughout this study, reinforce that AI-generated academic content must be critically evaluated to preserve scholarly authenticity.

Practically, the framework provides a structured model for educators, but its implementation requires teacher training, infrastructural readiness, and policy alignment. Limitations include lack of empirical validation and potential variability in AI output accuracy.

6. CONCLUSION

This study presents an AI-driven pedagogical framework for integrating ChatGPT into primary school education. The framework demonstrates that ChatGPT enhances instructional efficiency, classroom engagement, and formative assessment processes while maintaining the central role of teachers.

However, challenges such as academic integrity risks, dependency issues, and ethical concerns must be addressed. The study contributes to ongoing discussions on AI in

education by offering a structured implementation model grounded in existing literature.

Future research should focus on empirical validation of the framework across diverse educational contexts and long-term impacts on student cognitive development.

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