EDAI FRAMEWORK – INTEGRATING PROMPT ENGINEERING AND KNOWLEDGE GRAPHS FOR PERSONALIZED LEARNING

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The EdAI Framework is developed by integrating KGs for structured knowledge representation and Prompt Engineering for adaptive interactions. Learner Modeling is implemented by mapping learner progress onto KGs to generate dynamic, personalized educational experiences.

ABSTRACT

The increasing integration of Artificial Intelligence (AI) in education has paved the way for adaptive and personalized learning. However, traditional methods rely on static assessments that do not cater to individual progress. The EdAI Framework addresses this gap by combining Knowledge Graphs (KGs) and Prompt Engineering to offer dynamic, transparent, and engaging learning experiences.
KGs structure domain knowledge, while Prompt Engineering utilizes AI-driven language models to deliver real-time, personalized learning interactions.

INTRODUCTION

AI-driven education lacks adaptability, often relying on rigid models. KGs dynamically structure content, while Prompt Engineering personalizes interactions. This research proposes EdAI to integrate both, creating a scalable, interactive learning environment.

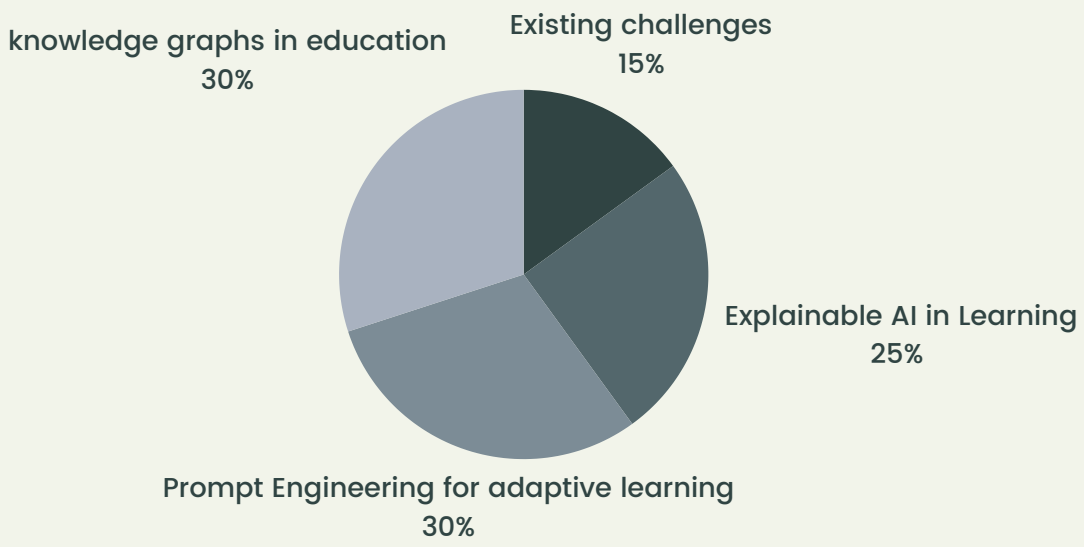
PRELIMINARY CONSIDERATIONS

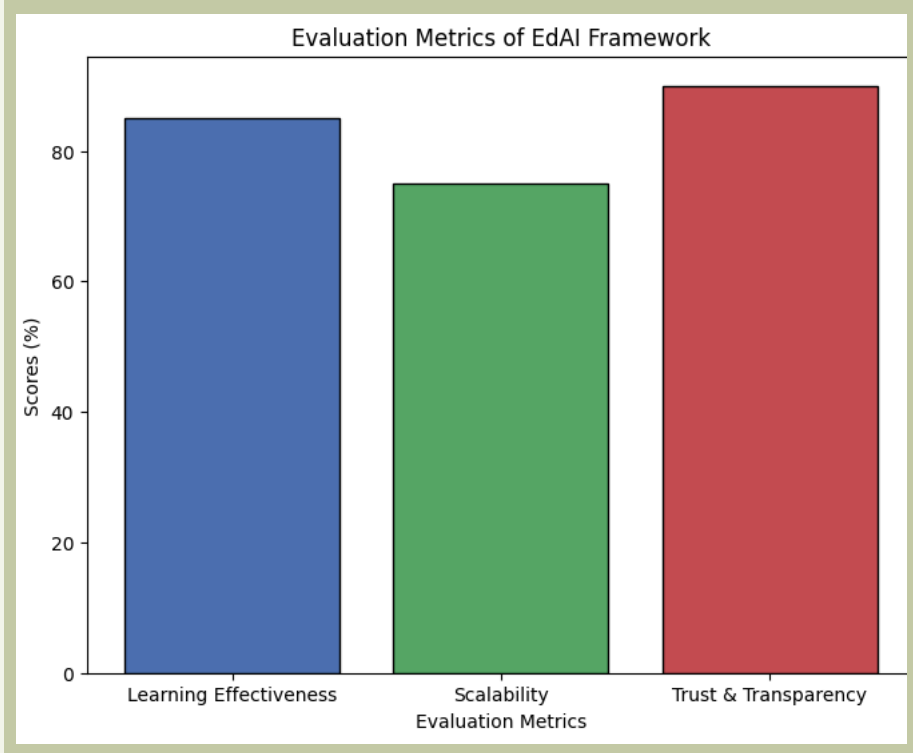
Early results indicate that KG-driven adaptive prompts improve knowledge recall and engagement.
Real-time AI-driven explanations enhance learner motivation and trust, while personalized learning pathways lead to better retention and skill development.

METHODOLOGY

The EdAI Framework = Knowledge Graphs + Prompt Engineering for adaptive interactions.
Learner Modeling is implemented by mapping learner progress onto KGs to generate dynamic, personalized educational experiences.
Evaluation Metrics include:

- Learning Effectiveness: Improvement in knowledge retention and comprehension.
- Scalability: Performance across varied subject areas and learner demographics.
- Trust & Transparency: User feedback on AI-generated explanations and recommendations.





LITERATURE REVIEW

Personalized learning relies on structuring complex knowledge, tracking learner progress, and adapting content dynamically.

Knowledge Graphs (KGs) organize educational material, helping identify knowledge gaps and recommending relevant learning resources. Research indicates that KGs improve knowledge retention by visually and relationally structuring concepts.

Prompt Engineering enables adaptive, AI-driven learning experiences by generating personalized responses and real-time feedback. Adaptive prompts have been shown to enhance self-paced learning, improving comprehension and engagement.

Explainable AI (XAI) ensures transparency in AI-driven education by providing clear, interpretable feedback. This is crucial for trust and system reliability, as students and educators need to understand why specific recommendations are made. Techniques like decision visualization and interactive explanations have been applied in intelligent tutoring systems to improve trust and personalization.
Despite these advancements, traditional learning models lack dynamic adaptability and AI-driven tools often struggle with personalization.

CONCLUSION

EdAI advances AI-driven learning by integrating structured knowledge (KGs) and adaptive interactivity (Prompt Engineering). It enhances explainability, scalability, and personalization, addressing limitations of static learning models. Future work will optimize AI transparency and adaptive mechanisms.

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