Towards Effective Explanation Generation in Autonomous Coaching Agents with Generative AI

Grace Brazil
Design Intelligence Lab
Georgia Institute of Technology
gbrazil2@gatech.edu

1 INTRODUCTION

This research aims to gain comprehensive understanding of learning theory and explanation generation in autonomous coaching agents in instructional settings. Firstly, it seeks to comprehensively understand the theory of learning and its impact on skill acquisition within educational environments. Secondly, it aims to explore explanation generation methods in AI and how it can incorporate Generative AI methods, particularly Large Language Models, to enhance the effectiveness of autonomous agent systems for learning purposes.

2 RESEARCH OBJECTIVES

In pursuit of addressing the key facets of learning theory and autonomous agents that can explain and reason, the following research objectives are:

- To develop a comprehensive understanding of how active learning and cognitive engagement impacts skill acquisition in educational settings.
- To explore explanation generation within autonomous agent systems, drawing insights from current research in AI to improve its effectiveness of explanations provided to learners.
- To explore the use cases of Generative AI methods, particularly Large Language Models (LLMs), in instructional systems.

3 LITERATURE REVIEW

A comprehensive examination of past studies concerning the following:

- ICAP Theory of Learning: Delve into the ICAP (Interactive, Constructive, Active, Passive) theory of learning, examining its implications for cognitive engagement and skill acquisition in educational contexts.
- TMKL2: Review TMKL2, the language framework employed in the development of Intelligent Agents, focusing on its structure and effectiveness in repre-

senting problem-solving skills and facilitating active learning.
- Explanation Generation in AI: Review current research on explanation generation in Artificial Intelligence, considering both implementation strategies and evaluation methodologies.
- Role of Language Models in Learning: Examine the potential of LLMs and their integration into instructional systems.

4 METHODOLOGY

In order to evaluate the research goals, the proposed methods may include:

- Experimental evaluation of explanation quality using different generative AI methods, which may examine factors such as coherence and relevance of explanations.
- Case studies of how LLMs are used for explanation and reasoning in AI agents.

5 PROJECT TIMELINE

- Week 1-3: Literature Review and Research Design
- Week 4-6: Data Collection
- Week 7-8: Data Analysis
- Week 9-10: Report Writing and Presentation Preparation

6 EXPECTED OUTCOMES

This research aims to achieve two outcomes. First, a comprehensive understanding of the roles played by active learning and cognitive engagement in shaping skill acquisition within educational environments. Second, a deeper insight into explanation generation in autonomous agent systems, specifically how to enhance the relevance of explanations for learners.

7 EVALUATION

Additional to the expected outcomes mentioned above, a short reflection on my summer work will be written and submitted for evaluation.

8 CONCLUSION

By investigating these areas, this study aims to provide insights to the field of educational technology, with the ultimate goal of enhancing the learning experience for students.