

Enhancing Leadership Skills of Construction Students Through Conversational AI-Based Virtual Platform

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Abstract: The construction industry is renowned for its dynamic and intricate characteristics, which demand proficient leadership skills for successful project management. However, the existing training platforms within this sector often overlook the significance of soft skills in leadership development. These platforms primarily focus on safety, work processes, and technical modules, leaving a noticeable gap in preparing future leaders, especially students in the construction domain, for the complex challenges they will encounter in their professional careers. It is crucial to recognize that effective leadership in construction projects requires not only technical expertise but also the ability to communicate effectively, collaborate with diverse stakeholders, and navigate complex relationships. These soft skills are critical for managing teams, resolving conflicts, and driving successful project outcomes. In addition, the construction sector has been slow in adopting and harnessing the potential of advanced emerging technologies such as virtual reality, artificial intelligence, to enhance the soft skills of future leaders. Therefore, there is a need for a platform where students can practice complex situations and conversations in a safe and repeatable training environment.

To address these challenges, this study proposes a pioneering approach by integrating conversational AI techniques using large language models (LLMs) within virtual worlds. Although LLMs like ChatGPT possess extensive knowledge across various domains, their responses may lack relevance in specific contexts. Prompt engineering techniques are utilized to ensure more accurate and effective responses, tailored to the specific requirements of the targeted users. This involves designing and refining the input prompts given to the language model to guide its response generation. By carefully crafting the prompts and providing context-specific instructions, the model can generate responses that are more relevant and aligned with the desired outcomes of the training program.

The proposed system offers interactive engagement to students by simulating diverse construction site roles through conversational AI based agents. Students can face realistic challenges that test and enhance their soft skills in a practical context. They can engage in conversations with AI-based avatars representing different construction site roles, such as machine operators, laborers, and site managers. These avatars are equipped with AI capabilities to respond dynamically to user interactions, allowing students to practice their communication and negotiation skills in realistic scenarios. Additionally, the introduction of AI instructors can provide guidance, feedback, and coaching tailored to the individual needs of each student, enhancing the effectiveness of the training program. The AI instructors can provide immediate feedback and guidance, helping students improve their decision-making and problem-solving abilities.

The proposed immersive learning environment is expected to significantly enhance leadership competencies of students, such as communication, decision-making and conflict resolution in the practical context. This study highlights the benefits of utilizing conversational AI in educational settings to prepare construction students for real-world leadership roles. By providing hands-on, practical experience in dealing with site-specific challenges, students can develop the necessary skills and confidence to excel in their future roles.

Key words: Artificial Intelligence, Virtual Reality, Education, Construction, Leadership Training.

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