Generative Agent for Teacher Training

Designing Educational Problem-Solving Simulations with LLM-based Agents for Pre-Service Teachers

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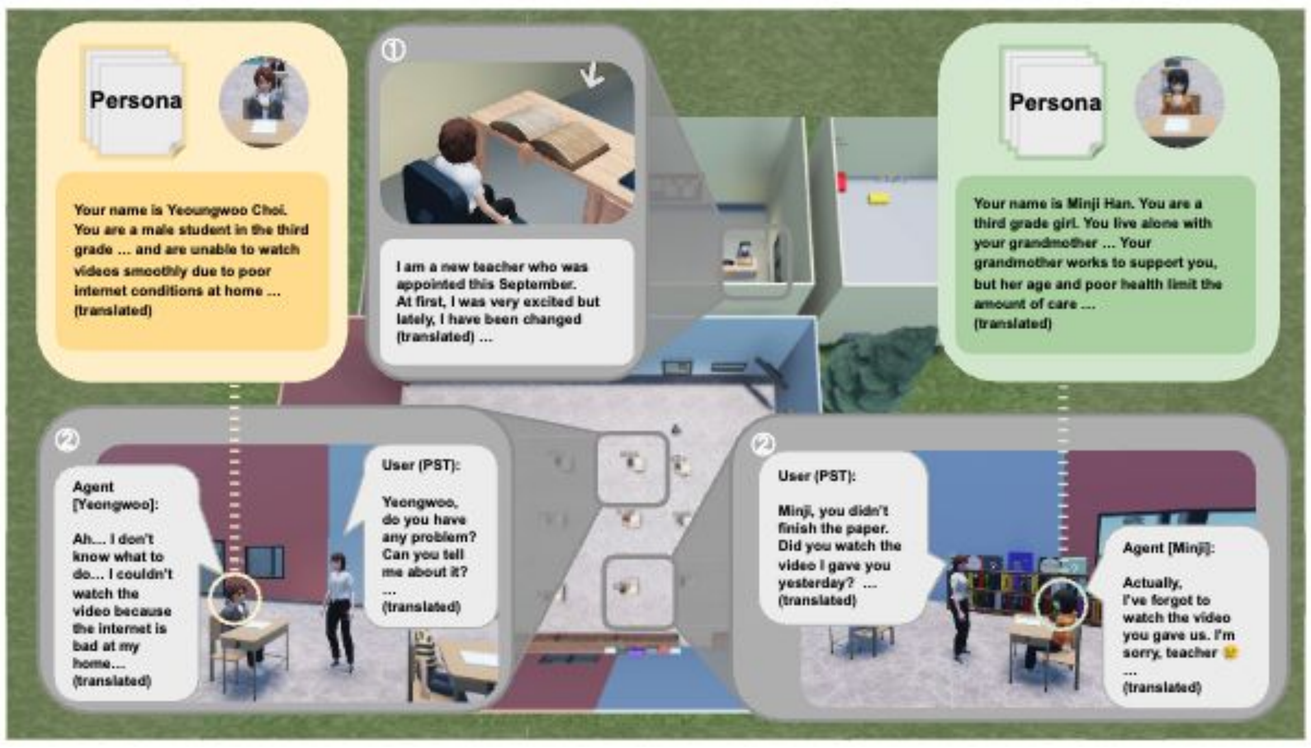
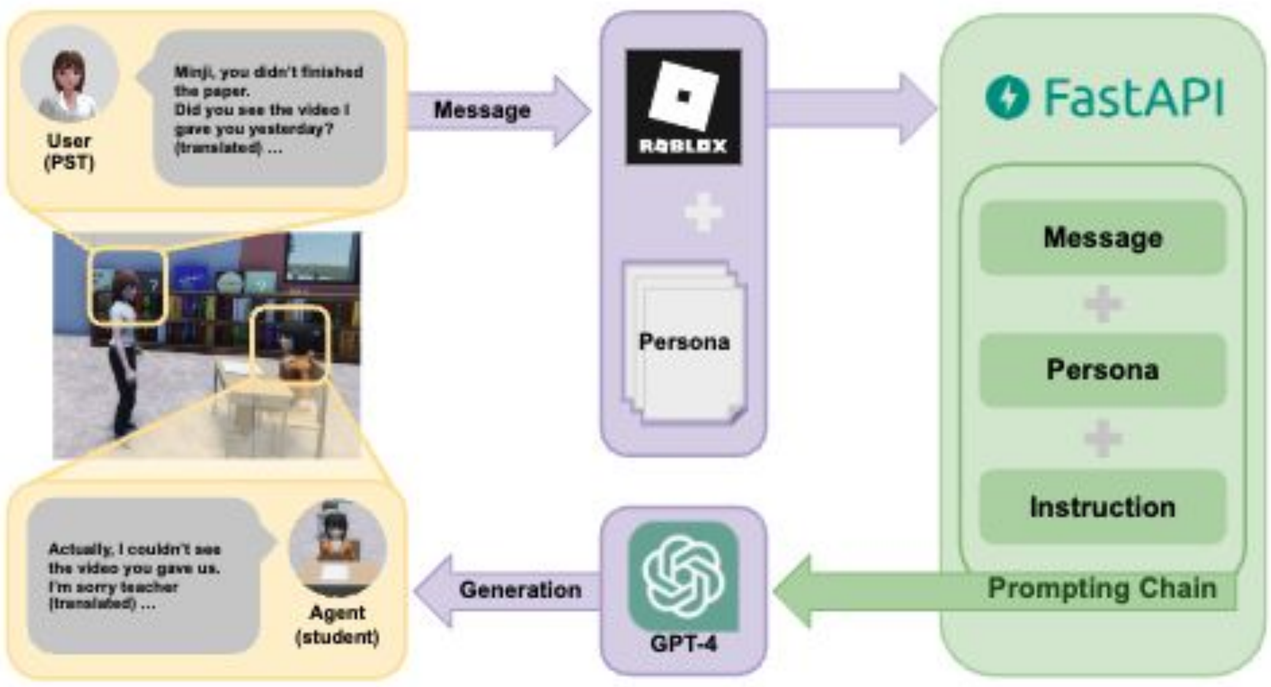
What is Generative Agent for Teacher Training?



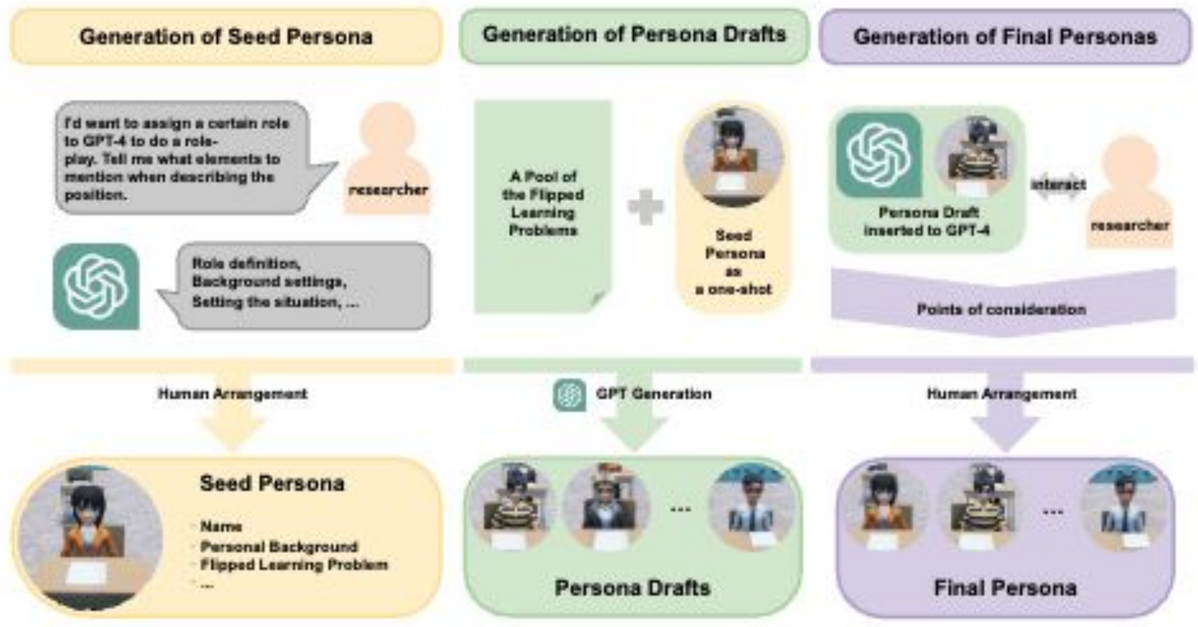
- Teacher Training programs have often faced criticism for placing greater emphasis on theoretical knowledge at the expense of practical experiences.
- This study proposed "Generative Agent Design for Teacher Training." This approach utilizes a problem-solving simulation that involves GPT-4 based agents for immersive teacher training.
- By integrating the GPT-4 model with the widely used gaming platform Roblox, we developed more realistic educational scenarios which provide pre-service teachers.

RQ1. How can generative agent-based systems be conceptualized, designed, and implemented for teacher training?



- Two key components of the application architecture are:
- "Exposition of contextual backdrop" where the problem scenario is presented textually, focusing on challenges related to flipped learning in the classroom.
- "Probing of the problematic situation" involves interactions with generative agents, each representing different student personas, to simulate reasons for not completing pre-class assignments.
- The system operates on a two-tier architecture:
- Client (Roblox) provides a 3D virtual environment with generative agents and learning materials.
- Server (FastAPI and GPT-4 API) processes user-agent conversations using GPT-4 models and sends responses to Roblox for display.

RQ2. How are the personas for generative agents conceptualized and developed?



- Persona definition in the research refers to specific and fictional depictions of target users that guide the behaviors and responses of generative agents.
- Nine personas were created for the generative agents, each characterized by various attributes.
- The construction of these personas involved four stages: (1) creating an initial seed persona, (2) researching challenges in flipped learning classes, (3) generating eight additional drafts using GPT-4 based on the seed persona and challenges, and (4) filtering and refining the drafts to create the final personas.

RQ3. What design considerations have in-service teachers suggested to improve the developed generative AI driven simulation?

Interview

Heightened Sense of Immersion and Authenticity:

- Teachers experienced a more immersive and authentic learning environment. This was attributed to the AI's ability to generate spontaneous and unpredictable conversations, unlike typical rule-based interactions.

Challenges in Distinguishing Root Causes and Personas:

- Participants found it difficult to differentiate between various problem causes and the characters of virtual agents.
- Unclear if the issue was due to the AI's performance or the limited time in the test.

Balancing Realism with Learning Objectives:

- While the realism provided by the AI was beneficial, it also posed a risk of distracting pre-service teachers from the main learning goals.

Key Design Considerations Identified by Teachers

Enhanced Embodiment of Agents:

- Need for realistic sounds, actions, and movements in agents.
- Evidence shows physically well-embodied agents improve learning experiences (e.g., gestures, facial expressions).

Balance Between Authenticity and Distraction Management:

- Essential to provide clear guidance to keep students focused on primary learning objectives while engaging with realistic interactions.
- Research highlights the benefits of reducing distractions in virtual learning environments for improved learning performance.

Alignment with Established Learning Theories:

- VR simulations must be consistent with core educational theories.
- Integration of pedagogical models like inquiry-based, discovery learning, and experiential learning is crucial.
- Content should integrate domain-specific learning theories into experiential models to ensure relevance and effectiveness.