Greater Ambition, Broader Horizons: Building an AI Agents Platform for Teaching and Learning for Chinese Enhancement Courses, HKU

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Abstract

The integration of artificial intelligence (AI) in e-learning within the education sector reveals its transformative potential for enhancing teaching methodologies for both students and educators. To align with our university's AI-ready policy, our programme has adopted various ICT tools and strategies to improve accessibility and teaching efficiency, while also preparing both teachers and students for a technology-driven future. In this paper, we will discuss and share the experiences of leveraging AI tools to personalize teaching and learning pathways that facilitate immediate feedback and tailored content to address individual teaching and learning needs for both teachers and students. We introduced a six-tier pyramid of AI applications, ranging from basic chatbots for FAQs to advanced language models that adapt to the evolving educational landscape while equipping teachers with innovative tools. Evidence from implemented e-learning initiatives, such as virtual reality (VR) and artificial intelligence (AI), highlights the changing of pedagogical principles, and the challenges teachers and students encountered and are being solved. Through these adoptions, we can observe how teaching and learning are evolving to meet the demands of a technology-driven educational landscape.

Keywords: artificial intelligence, e-learning, teaching methodologies, personalized learning

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Introduction: Critical Pedagogical Shifts Under GenAI

The deep impact of Generative Artificial Intelligence (GenAI) on higher education is that it has fundamentally changed the teaching and learning practices in recent years. (Ahmad et al., 2021; Teaching and Learning Research Center, n.d.). It has become the key factor of classroom reform in the era of information 2.0 (Liu & Wang, 2020). Nowadays, GenAI is not merely a tool in helping students indulge in a novel learning experience itself, but also as a force reshaping the teacher's role (Gentile et al., 2023). As "teachers find themselves at the forefront of a revolution that demands not only a reimagining of pedagogical approaches but also a continuous commitment to professional development" (Cukurova et al., 2024, p. 4).

The recent advances in GenAI, particularly those conversational AI agents that enabling natural language understanding and generation, have created a new learning environment where machines communicate on human terms and support learning in novel ways (Li et al., 2024), thus allows students to gain greater potential in learning autonomy (Sari, 2023) and personalized learning opportunities through pseudo-life scenarios, whether on computer-based applications or in a virtual reality environment like Meta's Quest, Microsoft's HoloLens, or Apple's Vision Pro. Under this change, the role of the teacher is evolving from a sole knowledge transmitter to a collaborator (Kamalov et al., 2023), a mentor (Ghamrawi et al., 2024), and a coach (George, 2023). Beyond facilitating student-centered learning, teachers became designers and maintainers in a sustainable AI-assisted learning environment. This requires teachers to engage with AI as allies in providing AI tools that can enhance students' critical thinking, creativity, and lifelong learning.

Table 1
Critical Pedagogical Shifts

Traditional Role	AI-Driven Role
Knowledge transmitter	Adaptive learning pathway designer
Uniform assessment enforcer	Diagnostic feedback interpreter
Task execution supervisor	Cross-disciplinary task architect
Isolated skill evaluator	Holistic competence assessor

From Knowledge Transmitter to GenAI Agent Developer

As the University of Hong Kong aims to be AI-ready by September 2025, it is crucial to align with the university's AI policies by integrating Generative AI (GenAI) into the Chinese language courses offered by the Chinese Language Enhancement Programme (CLEP) under the School of Chinese.

Since 2023, CLEP has developed a number of AI tools to enhance teaching and learning activities by Dr. C.M. Chan and his team. These tools range from content creation, graphic design, communication skill development, brainstorming and strategy formation, modern and ancient language learning, to oral and video presentation support.

Figure 1

*An AI Essay Feedback System for Students to Evaluate Their Writing Assignments*

Note. Teachers can also utilize it to give periodic feedback on students' assignments.

Figure 2

An AI Poster System Is Designed to Help Students Create Their Poster Assignments
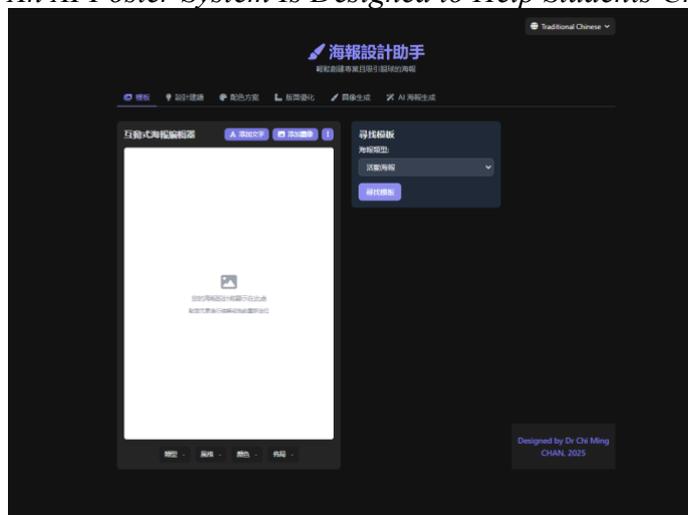
Figure 3
An AI-Powered Face-Checking System Is Designed for Training Students to Maintain Focus on the Camera During Presentations and Video Recording Assignments
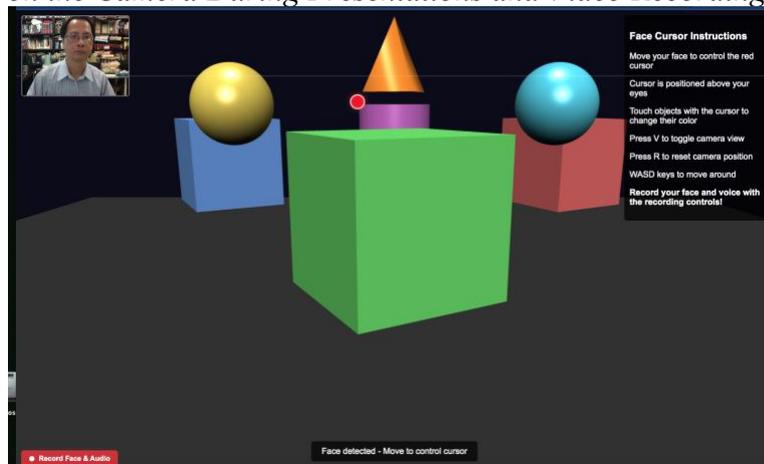
Note. Student can control the red dot by moving his/her head in alignment with the device's camera to train the proper eye contact. This system also has a record function for students to review and improve their performance at a later time.

These AI tools broaden access to resources and break the constraints of interaction in a conventional classroom, thus promoting autonomy in the language learning process.

From RECTI to RECTI-AI Approach

Some of our CLEP courses, like CBBA9003 (Business Chinese) and CSSC9001 (Practical Chinese for Social Sciences Students) in CLEP, have adopted a comprehensive teaching model of RECTI (Revitalize, Enhance, Create, Transfer, and Integrate) in recent years to design the learning activities. The RECTI model provides a systematic training framework for enhancing students' proficiency in written, visual, and oral communication by consolidating, enriching, transferring, and integrating language knowledge into their disciplines. Teaching and learning activities are divided into five phases:

1. **Revitalize**: to identify and revitalize foundation knowledge and communication skills through exercises.
2. **Enhance**: to deepen students' understanding by providing specific resources to complete problem-solving tasks in simulated scenarios.
3. **Create**: to conduct interdisciplinary projects to integrate the usage of the Chinese language in various academic subjects.
4. **Transfer**: to apply language and communication skills in other professional contexts or other novel situations.
5. **Integrate**: to enable students to express complex concepts across their subject disciplines.

Since AI-assisted learning is mainstream in education in the future, it is necessary for the RECTI model to incorporate AI. The new Recti-AI model enhances language learning with innovative AI tools like chatbots, customized AI agents, and AI avatars to create specific learning content for various subjects. It changes the role of teachers, making them guides who help students adapt their learning practices. It addresses the growing need for effective communication skills that bridge technical and non-technical subjects (Olkhovaya et al., 2016).

The integration of AI technologies into RECTI improves learning materials and methods, encourages creative language use, facilitates knowledge transfer between different contexts, and incorporates language proficiency into complex disciplinary tasks. This integration not only enriches students' learning experience but also prepares them to excel in the world of AI-mediated communication and knowledge work, which is becoming more common. As a result, teachers transition from transmitters of knowledge to facilitators and designers in the AI-enhanced learning environment.

A Centralized Generative AI Platform for Language Enhancement: The VCLLCBOT Platform

To effectively implement AI strategy in CLEP, we also launched a project aimed at creating a comprehensive GenAI platform, VCLLCBOT, designed for widespread adoption across the university to help students enhance their Chinese language proficiency. This initiative focuses on providing a secure, flexible, and accessible environment for teachers and students to gain competence in AI, enhancing teaching, learning, and administrative processes (Remarks: VCLLC stands for Virtual Chinese Language Learning Centre).

Figure 4
VCLLCBOT: AI Agent Creation Platform
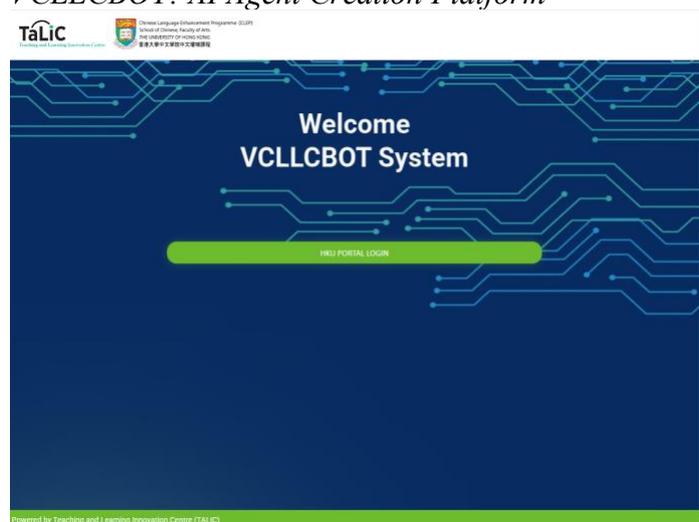
Figure 5
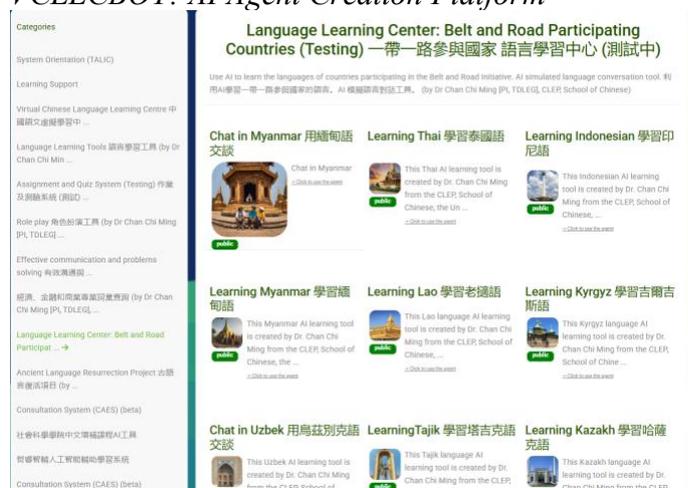*VCLLCBOT: AI Agent Creation Platform*
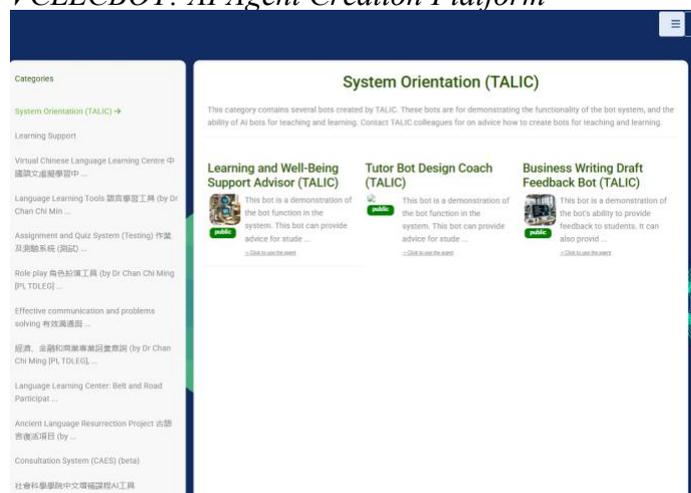
Figure 6
VCLLCBOT: AI Agent Creation Platform

Figure 7
VCLLCBOT: AI Agent Creation Platform

Figure 8
VCLLCBOT: AI Agent Creation Platform

The VCLLCBOT is an initiative in AI-enhanced pedagogy, developed through strategic collaboration between CLEP and the Teaching and Learning Innovation Centre (TALIC),

funded by the Teaching Development and Language Enhancement Grant (TDLEG). This project establishes a POE-like GenAI platform for teaching and learning in the Chinese language through AI agents. Its architecture addresses four core features, each yielding distinct pedagogical benefits.

1. Centralized Repository for AI Agents created by teachers and students
   This is the foundational feature which provides teaching staff and students with a dedicated hub to deploy discipline-specific AI agents. The centralized repository enables teachers to align AI tools directly with the course learning purpose while facilitating cross-departmental collaboration through shared development standards. It also ensures the university's governance over data privacy protocols.

2. Dual-Pathway Agent Architecture
   The VCLLCBOT Platform uses a dual-pathway design to support both specialized knowledge and broad skill development:
   - Discipline-specific agents function as specialized tutors, trained in specific program areas. For instance, a linguistics-focused agent for economics and finance students provides tailored writing frameworks that generic tools cannot offer. This helps students master discipline-related writing conventions and nuanced expressions.
   - General-purpose agents, on the other hand, support foundational literacies across Chinese language enhancement courses. They standardize assistance for rhetorical refinement, presentation structuring, and Chinese language knowledge.

3. Cognitive Apprenticeship via HOTS Agents
   Higher order thinking skill (HOTS) agents go beyond simple tasks to act like expert mentors. They are decided by teachers and use the Socratic scaffolding method by asking a series of questions to break down complex tasks. They guide students to brainstorming, analyzing targets, conducting decision-making, and building strategies to complete the tasks assigned by teachers through questions. This turns AI from just an information provision tool into a partner that helps students develop strategic thinking and problem-solving skills.

4. Diachronic-Synchronic Language Expansion
   The platform extends linguistic support across temporal and contextual dimensions:
   - Modern Language Modules enable comparative syntactical analysis across living languages (e.g., pragmatic contrasts in Mandarin-Cantonese discourse) using a multilingual translator.
   - The historical languages sub-platform facilitates philological reconstruction through corpus-based morphological analysis of Classical Chinese. These capabilities enable temporal literacy by simulating historical communicative contexts, allowing students to engage with language as a dynamic historical artifact.

The VCLLCBOT Platform allows teachers and students to create and utilize AI agents for teaching and learning, with 120 AI agents developed to date, including 110 currently active and 10 inactive. The platform integrates into 13 courses and involves 1,168 students (over two-thirds of CLEP students), provides direct access through course Moodle pages, enabling students to enhance their Chinese language and communication skills through interactive learning. By April 2025, it has facilitated 7,296 message exchanges and 2,025 topic

discussions, demonstrating its effectiveness in promoting engaging and dynamic learning experiences.

Six-Tier Pyramid (STP) for AI-Enhanced Language Teaching and Learning

The philosophy behind the adoption of AI in CLEP's teaching and learning method comes from the Six-Tier Pyramid (STP) for AI usage initiated by Dr. C.M. Chan of CLEP, which emphasizes that AI should not be used as a tool to generate immediate knowledge for use only. AI in learning is rather a significant advancement of the processing of knowledge through digestion, extraction, organization, and presentation (DEOP). We believe that mastering and practicing the DEOP sequence is essential for every student. What AI integration contributes to the DEOP sequence is that it streamlines the traditional time-consuming DEOP process, delivering results in seconds which would otherwise require significant effort and time. It should not be a replacement tool for the process itself.

For example, students in CSSC9001 will collaborate in groups to discuss discipline-related case studies with the AI tools offered by the class teachers during the lesson. They then compared and critiqued the AI-generated works, evaluating the effectiveness of AI in strategy formation and completion of the writings. During the lesson, they will learn how to craft effective prompts for best tasks through group discussion. This comprehensive approach aims to develop students into proficient users of AI, enabling them to leverage it as a powerful tool for brainstorming, strategizing communication, generating content, and critically assessing their outputs for better results.

The STP structure aims to maximize the functionality and benefits of deploying AI in language teaching and learning for teachers and students by redefining its role in language learning, showing how AI tools can evolve from a basic automation tool to an advanced cognitive partnership.

Figure 9
Six-Tier Pyramid (STP) for AI-Enhanced Language Teaching and Learning
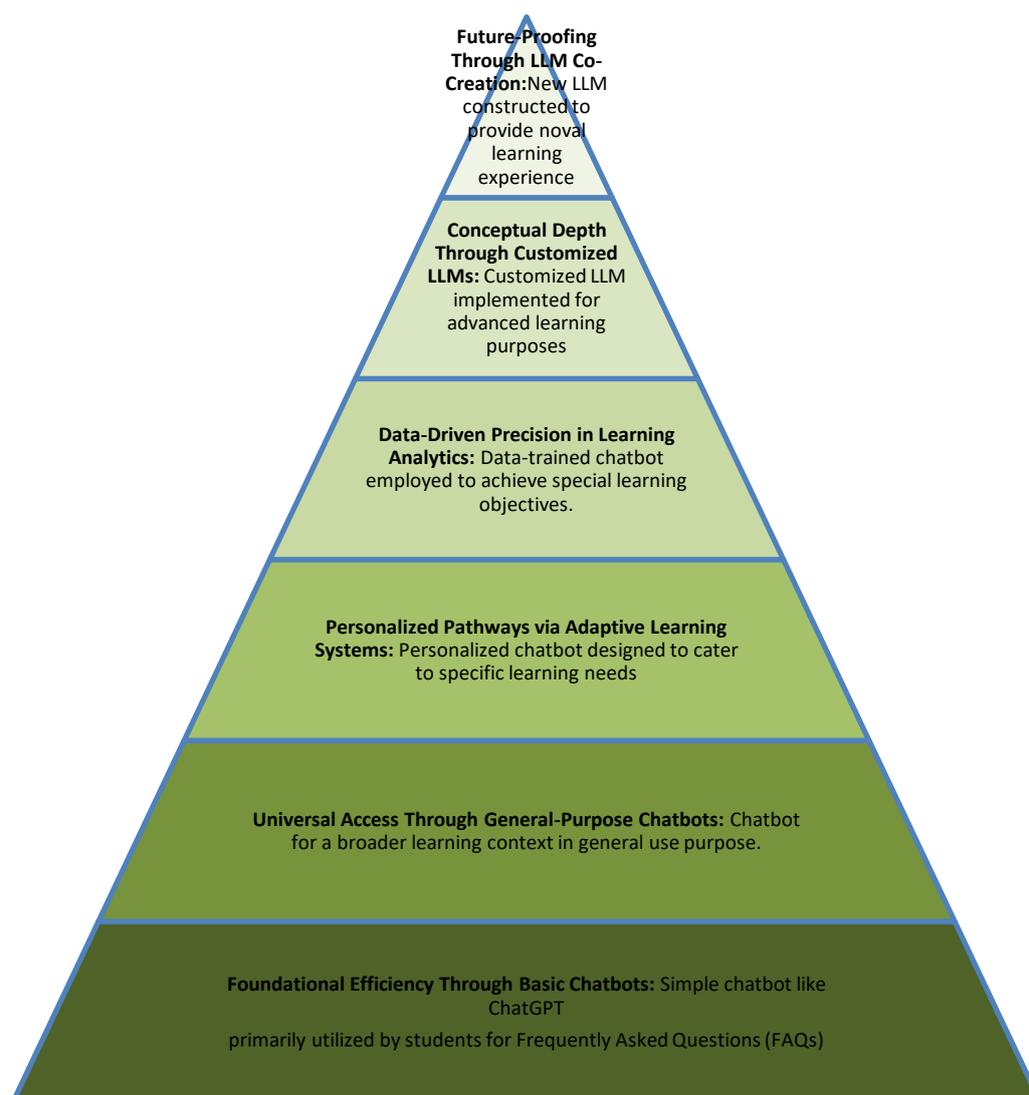
Tier 1: Foundational Efficiency Through Basic Chatbots:
This foundation tier contains basic chatbots designed to automate replies to repetitive tasks like general information enquiries, answering basic grammatical rules of the Chinese language, assignment submission deadlines, etc. Students can immediately access answers during self-directed study via these chatbots.

Tier 2: Universal Access Through General-Purpose Chatbots:
The second tier includes general-purpose chatbots that offer cross-disciplinary information, bridging the gap in language learning and subject-specific knowledge. This will ensure equitable access to foundational knowledge provided by LLMs while preserving the educator's role as a contextual guide through background prompts writing. Tools in this tier enable teachers to curate enriched lesson materials. Students also benefit from the preset chatbots to deepen their understanding of concepts.

Tier 3: Personalized Pathways via Adaptive Learning Systems:
The third tier uses AI agents to identify and analyze the strengths and weaknesses of students through data analytics. These agents enable teachers to tailor instructions and

recommendations to students on subject-related assignments. For example, a student struggling with sentence structure might receive targeted exercises to recognize his/her weakness.

Tier 4: Data-Driven Precision in Learning Analytics:
The fourth tier includes data-trained chatbots to provide precise insights into language and communication issues. One example is recognizing a class-wide weakness in Chinese idioms usage and creating agents for strengthening it accordingly. Students benefit from precise, evidence-based feedback and exercises.

Tier 5: Conceptual Depth Through Customized LLMs:
At the fifth tier, teachers will customize LLMs to handle complex linguistic concepts through recontextualization to explain specialized ideas or skills. For instance, LLM trained on classic Chinese resources could clarify syntactic differences relative to Standard Chinese.

Tier 6: Futureproofing Through LLM Creation:
The sixth tier focuses on developing specific LLMs to conduct tailored niche linguistic domains. This process not only ensures technical proficiency but also cultivates AI literacy, enabling teachers and students to critically evaluate AI tools' outputs.

From Tool Usage to Future-Ready Competencies: An Eight-Dimension AI Literacy Framework

The VCLLCBOT Platform highlights the powerful use of AI in cross-disciplinary language learning under the idea of the Six-Tier Pyramid. It creates a learning partnership between teachers and students to develop their future-ready AI skills and AI literacy through the AI agents. We also developed the "Eight-Dimension AI Literacy Framework" to measure the competency of AI literacy.

The principles of the Eight-Dimension AI Literacy Framework are the outcome of our teaching and learning practices, as well as the formative approaches and guidelines developed by other institutions, such as the five foundational dimensions of AI literacy (Digital Education Council, 2026), insights from the Drexel University guide, and UNESCO's AI and education reports. The "Eight-Dimension AI Literacy Framework" integrates a broader, more nuanced perspective, bridging educational innovation with the competencies needed for an AI-driven future. (Digital Education Council, 2026) This framework combined technical competence, critical evaluation and ethical application:

Table 2

Eight-Dimension AI Literacy Framework

Dimension	Core Focus	Key Competencies
1. Foundational Awareness	Basic AI concepts	-Distinguishing AI tools from traditional software -Recognize AI systems in daily life -Identify common AI applications (e.g., chatbots, recommendation engines)
2. Technical Interaction	Operational proficiency	- Navigate AI interfaces (e.g., ChatGPT) - Input effective prompts - Retrieve and refine outputs - optimizing queries for research
3. System Mechanics	Understanding AI workflows	- Grasp data training processes - Identify algorithmic limitations - Troubleshoot basic errors
4. Critical Evaluation	Output assessment	- Analyze the relevance, accuracy, and utility of AI outputs - Select appropriate context strategies - Verify alignment with task requirements
5. Ethical Integration	Responsible deployment	- Address privacy/security risks - Mitigate bias in AI applications - Ensure transparency in AI-assisted work
6. Adaptive Innovation	Creative problem-solving	- Repurpose AI tools for novel scenarios - Combine AI with human ingenuity - Develop hybrid solutions
7. Social Responsibility	Macro-level impact	- Evaluate AI's societal implications - Advocate for equitable policies - Lead ethical AI adoption in communities
8. Global AI Leadership and Innovation	Future-oriented innovation	Design AI for global challenges (climate, equity)

This Eight-Dimension AI Literacy Framework emphasizes the importance of basic technical competence as well as critical evaluation, ethical application, human-centric creative and innovation, and understanding AI's ethical and societal implications. It also helps students to leverage AI as a powerful learning partner for ethical, interdisciplinary, and problem-solving in the increasingly complex global environments.

Conclusion: Next Development

The integration of AI in language learning requires tailored GenAI models, AI agents and tools which meet individual learners' needs for real-time insights and feedback into students' progress, strengths, and areas for improvement. To serve this purpose, we have developed an avatar-led learning environment and will be implementing it in the coming semester in 2025.

Figure 10
An AI Avatar in WebXR Classroom
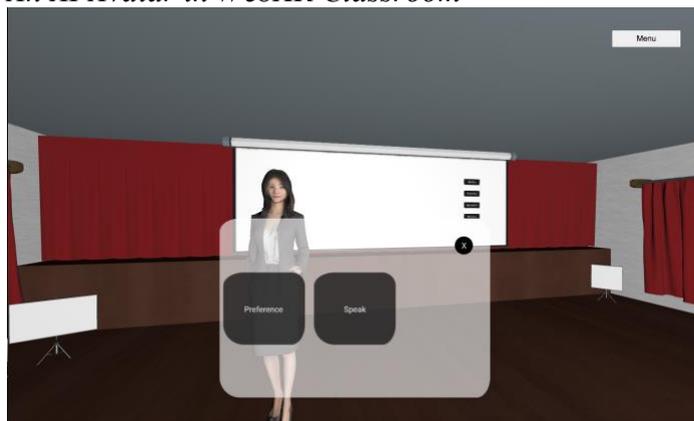
Note: The AI Avatar acts as a teacher or consultant to directly engage in conversations with students and provides a pseudo-life environment in WebXR and virtual reality for language learning.

To succeed in an AI-driven future, students and teachers must adopt a mindful and forward-thinking mindset. AI should not be a mere instrument for task completion, but as a tool for intellectual stimulation and deeper exploration. Treating AI as a tool for sparking curiosity, creativity, and critical thinking, teachers and students can unlock the full potential of AI to enhance problem-solving skills, promote innovation, and encourage lifelong learning. This shift in perspective will turn AI into a dynamic partner toward meaningful growth and success, rather than just for efficiency in task completion.

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