Development of experiential Chinese language learning materials and systems utilizing VR

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The purpose of this study is to develop and construct a new experiential Chinese language learning material and learning system utilizing VR (Virtual Reality). To achieve this goal, between April 2023 and March 2024, we addressed three tasks: (1) development of VR learning materials for beginner Chinese learners, (2) development of video materials using local resources from Taiwan, and (3) implementation of Chinese language classes in VR chat spaces. Especially with regard to issue (3), participants responded that "It was fresh and interesting" and "It was similar to reality" were received, confirming significant potential for this new method of remote teaching in the future.

Keywords:*Digital textbook1, Chinese Class2, VR3, VRChat-based metaverse classroom4*

Introduction

This paper introduces our research on an immersive Chinese language education system using VR technology, which began in 2022.The motivation for this research is threefold. First, although online classes became widespread before and during the pandemic, there remain limitations. Students have expressed concerns that online learning lacks realism and cannot fully substitute in-person instruction. As full-scale in-person classes may remain difficult in the future, educational institutions must explore alternative teaching methods.

Second, the rising cost of travel has made it increasingly difficult for students to participate in overseas programs. Promoting internationalization has become ever more important for educational institutions.

Third, VR technologies have rapidly evolved in recent years. Systems using VRChat for English, Korean, and Chinese language education have already shown promising results. As faculty members at national colleges of technology, we saw potential in applying such technologies to Chinese language education.

Fortunately, our team includes both language educators and information engineers. Since 2022, we have actively worked to develop this project.

A New Experiential Chinese Learning Platform Using Virtual Space

In this new experiential Chinese language learning sy stem utilizing virtual space, students and teachers in Tai wan and Japan can wear VR headsets to immerse thems elves in various Chinese learning experiences within a v irtual environment.

In the **Virtual Classroom**, Japanese students can attend live Chinese language lessons conducted by native Taiwanese teachers while remaining in Japan.

In the **Language Exchange Space**, both Taiwanese and Japanese students can participate together and freely engage in language learning—Chinese, Japanese, and English—through interactive games and quizzes installed in the space.

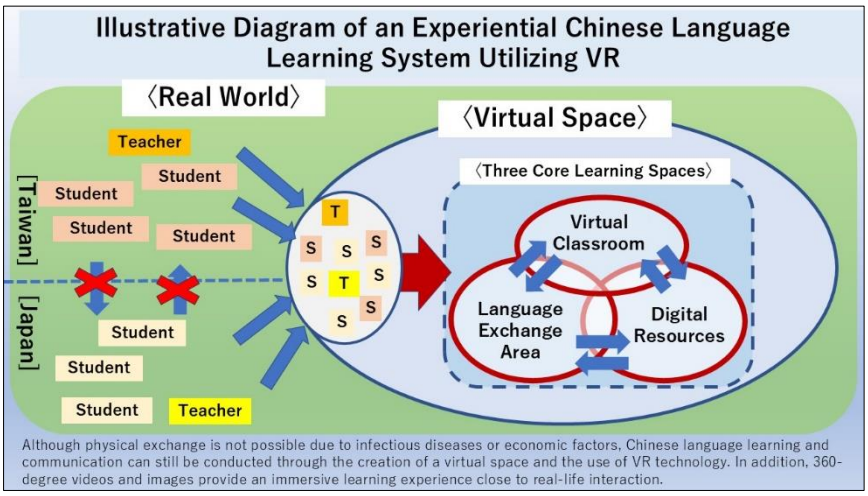


Figure 1 Illustrative Diagram of an Experiential Chinese Language Learning System Utilizing VR

In the **Digital Resources Area**, users can upload and explore videos and images captured with 360-degree cameras and Go Pros to visually experience and learn

about facilities and tourist attractions described in the textbook.

Figure 1 **Illustrative Diagram of an Experiential Chinese Language Learning System Utilizing VR**

Although these spaces are independent from each other, users can freely move between them at any time by entering the designed virtual world with their VR headsets.

The following outlines our research project that began in 2022. Aiming to develop an experiential Chinese language learning system using virtual space, we have been working on the following three themes since 2022:
(1) Development of VR teaching materials for beginner-level Chinese learners
(2) Creation of video-based learning materials utilizing local resources from Taiwan
(3) Implementation of Chinese language lessons in a VR chat environment

(1) Development of VR Teaching Materials

Taiwan Mandarin: Exploring Taiwan is a beginner-level Chinese textbook consisting of 19 lessons themed around travel, incorporating both grammar instruction and content related to tourism. Two students from the Department of Applied Chinese at Wenzao Ursuline University of Languages developed the textbook as part of their short-term internship from October 2023 to February 2024.

Some of the lessons have already been uploaded to the virtual classroom and have been used in two instructional sessions.

Figure 2 Digital Textbook *Taiwan Mandarin: Exploring Taiwan*

In addition, the team led by Professor Hashimoto constructed a virtual classroom themed around Taiwanese night markets using Unity. This environment allows learners to participate by wearing VR headsets, solve problems, and enjoy interactive educational games.

(2) Production of Video-Based Teaching Materials Utilizing Taiwanese Regional Resources

In March 2024, the lead author conducted a field study in Tainan, guiding students in recording locations such as Chihkan Tower (赤嵌樓), Anping Fort(安平古堡), and Shennong Street(神農街) using a RICOH THETA Z1 and an Insta360 Ace Pro. These recordings were used to create immersive video-based teaching materials that provide learners with a vivid and engaging educational experience.

Figure 3 Video available in the Digital Resources area (神農街)

(3) Implementation of Chinese Language Lessons in VRChat

The team led by Professor Hashimoto created a virtual classroom themed around Taiwanese temples using Unity and uploaded it to VRChat. Two instructional sessions were held in this virtual space, which included several panels displaying lesson content. The classes were conducted by a Taiwanese student instructor and attended by eight students from Ube College and Matsue College. Participants used avatars to take turns approaching the panels and engaging with the lesson.

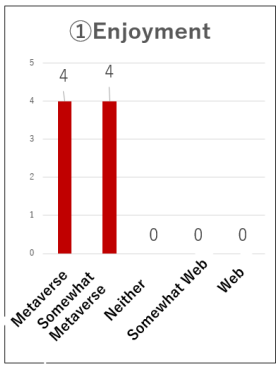
A parallel lesson using the same content was also conducted via Microsoft Teams to compare learning effectiveness between the two formats.

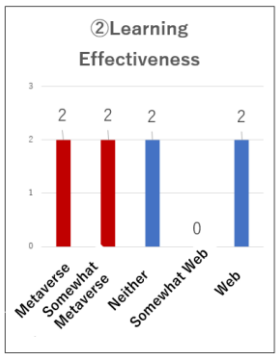
Figure 4 A class held in the VR classroom

Figure 5 Taiwanese and Japanese students participating in a VR class while wearing VR headsets

Survey Results

After the courses, a survey was conducted with eight students from colleges of technology who participated in both the VR-based and conventional online classes. The survey focused on three aspects: (1) enjoyment of the classes, (2) perceived learning effectiveness, and (3) expectations for future implementation. The results are summarized in Table 1-3.





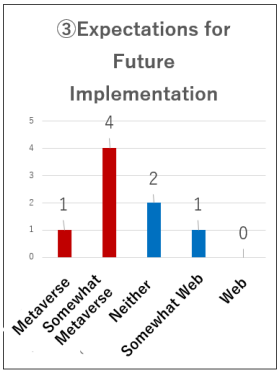


Table 1-3 Results of the Survey on Metaverse-based and Web-based Classe

(1) **Enjoyment**: All students reported that the VR-based class was more enjoyable. In the open-ended responses, comments such as “It was fresh and interesting” and “It felt like playing a game” were noted.

(2) **Learning Effectiveness**: Four students stated that the VR-based class was more effective, two preferred the online class, and the remaining two reported no preference.

Positive feedback for the VR class included comments such as, “The teacher could judge whether students were paying attention based on the orientation of their avatars, so we had to stay focused,” and “It felt like a face-to-face lesson, which was great.”

Negative feedback included remarks like, “It was hard to see because I usually wear glasses, and the VR headset affected my vision,” and “The avatars and panels overlapped, making the content difficult to view.”

(3) **Expectations for Future Implementation**: Five out of eight students expressed a desire to participate in future lessons conducted in the virtual classroom.

Conclusion

The achievements of this study to date are as follows:
(1) A digital Chinese language textbook titled *Taiwan Mandarin: Exploring Taiwan* was developed for use in VRChat.
(2) A virtual classroom and instructional slides were constructed within the VRChat environment.
(3) Taiwanese student interns conducted Chinese language lessons in the virtual classroom, and a comparative experiment was carried out with conventional online classes.

In 2025, we plan to develop a virtual environment equipped with three core functions—Virtual Classroom, Language Exchange Space, and Digital Materials Zone—as part of student research projects at colleges of technology. In addition, Taiwanese interns will continue to produce various types of instructional content as part of their internship projects, to be integrated into this virtual space.

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