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Preliminary Application of AR Technology in Teaching Chinese Mythology

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Abstract

This study employed augmented reality (AR) technology as a medium to integrate Chinese mythological content into Chinese language teaching and to investigate its effects on students' learning outcomes. A single-group pre- and post-test design was adopted with thirty-one secondary school students in Chiang Mai, Thailand. Participants completed knowledge tests before and after the AR-assisted instruction, while additional data on learning motivation and technology acceptance were gathered through questionnaires. Some students were randomly selected to conduct further interviews after the learning. The study's results showed that teaching myths with the introduction of AR technology significantly improved students' academic performance, as indicated by a mean score of 65.10 on the pre-test and 77.32 on the post-test ($t = -7.676$, $p < 0.001$). Additionally, motivation to learn and acceptance of the technology were at a high level. The majority of the students had a positive opinion of the AR instruction. In the interviews, students generally responded positively to AR teaching and expressed great anticipation for its future application in the Chinese classroom. The findings are consistent with existing research: AR technology can deepen learning understanding, stimulate learning interest, increase classroom engagement, and enhance motivation. This study serves as a reference for the application of AR technology in international Chinese language education, offering new, practical ideas for teaching traditional culture.

Keywords: Augmented Reality, ARGBL, Teaching Chinese mythology, Technology Acceptance, Learning Motivation

■ Introduction

With the rapid development of augmented reality (AR) technology in the field of education, it shows great potential in international Chinese language classrooms. Chinese mythology, as an integral part

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of Chinese culture, serves as both a subject and a window into the essence of Chinese culture for foreign students (Yunshan, 2022). By teaching Chinese mythological stories, learners can gain a deeper understanding of and identify with the aspects of history, culture, national psychology, and values embedded in traditional Chinese culture. However, due to cultural differences and language barriers, foreign students may face challenges such as a limited understanding and interest in learning traditional Chinese mythological stories. If we rely solely on traditional teaching methods, the classroom will become boring, and students will struggle to understand the content of the story (Cong, 2020; Shiyun, 2021). Some scholars believe that technology can be used as a tool and catalyst to improve and facilitate the learning process (Arunsirot, 2020). However, there is a gap in international Chinese language education, especially in the study of Chinese mythology as a content carrier. Then, how to introduce the emerging technology to innovate the mythological teaching mode to provide students with a more intuitive and interactive learning experience and to enhance the learning effect is an important issue in the current research on educational technology.

Augmented reality is a technology that combines real environments with virtual worlds (Azuma, 1997; Klopfer & Sheldon, 2010; Pattaravindechopat et al., 2023) and is widely used in the fields of education, entertainment, medical treatment, and life. Studies have shown that the use of augmented reality technology can create a learning space that integrates reality and fiction, simulate real learning situations, and better present learning content (Fangfang, 2016). And with the 3D pictures and text presented by AR technology, it can make it easier for students to understand the content, which significantly improves their learning interest and performance (Yukong & Suppakitjumnong, 2023). In the field of language teaching, there have been many studies that have attempted to combine AR with content such as vocabulary and historical stories with good results. Correspondingly, technology acceptance is also an important basis for evaluating the teaching outcomes of new technologies. This study uses the Technology Acceptance Model (TAM) as its theoretical guide. In TAM, perceived usefulness (PU) and perceived ease of use (PEU) are the main factors influencing user acceptance (Davis, 1989), which in turn further influence learners' attitude towards use (ATU) and behavioral intention (BI).

Therefore, this study incorporates AR technology into Chinese language classrooms, using the Chinese mythological story “The Lotus Lantern,” which is widely known in China and aligns with the principles of Chinese language and culture education for non-native speakers, as teaching material. The analysis is conducted from three perspectives: (1) The improvement in test scores reflects students' perceived usefulness of the technology; (2) The survey on learning motivation demonstrates students' immediate motivation levels after adopting the new technology, indicating its role in fostering positive attitudes; (3) The data from the questionnaire survey reveal students' adoption patterns of the technology, further validating the TAM explanatory framework. Therefore, TAM not only provides a theoretical basis for raising research questions but also provides direction for interpreting the results. Finally, this study provides empirical references for international Chinese language education and educational technology research.

■ Research Questions

The research questions in this study are grounded in the Technology Acceptance Model (TAM), which posits that learners' acceptance of new technologies is shaped primarily by perceived usefulness (PU) and perceived ease of use (PEU). These factors subsequently influence their attitude towards use (ATU) and behavioral intention (BI). Therefore, the research questions not only validate the potential for enhancing students' learning outcomes and motivation but also delve deeper into the extent to which students adopt AR tools during their use. Three questions were defined as follows:

RQ1: Were there significant changes in students' test scores before and after AR instruction?

RQ2: What is the overall performance of students in terms of motivation and technology acceptance?

RQ3: Is there a correlation between student motivation and technology acceptance?

■ Significance and Purposes

1) To study the changes in students' academic performance in their Chinese Mythology course before and after the implementation of AR instruction.

2) To evaluate the overall performance of students in terms of motivation and technology acceptance after experiencing AR teaching.

3) To explore the correlation between motivation and technology acceptance to further understand students' acceptance of AR teaching.

■ Literature Reviews

This study synthesizes data from a number of studies that demonstrate the effectiveness of AR technology in enhancing student achievement and influencing motivation and technology acceptance.

Augmented Reality in the Teaching of Language and Culture

The application of augmented reality technology in language teaching is mainly focused on Chinese and English teaching research. The application of augmented reality technology in English language teaching is beneficial to some extent in improving students' word learning ability and English daily conversation skills, as well as having a positive impact on the enhancement of learning interest and motivation (Lu, 2019; Shaumiwaty et al., 2022). And the teaching effect in Chinese language teaching also has better results, many researchers have found that AR technology used in Chinese language teaching helps to improve students' performance and can help students deepen their mastery of the shape, sound and meaning of the words, most of the students are satisfied with the use of AR in Chinese language teaching and are very much looking forward to more teachers to use AR technology in their teaching (Yayin, 2022; Pariyawatid &

Napapongs, 2015). Augmented reality technology not only changes the way of knowledge transfer, but also provides new possibilities for cultural communication. In terms of cultural classroom teaching, Pei (2020) used augmented reality technology to design and develop teaching courseware for the Dragon Boat Festival and the Mid-Autumn Festival, which are traditional Chinese festivals, and concluded that the addition of AR technology is conducive to enhancing the sense of participation in the classroom, focusing the attention of the students, and stimulating their interest in active learning, and that it can achieve better teaching results. Junchao (2021) carried out empirical evidence of contextualized teaching of Chinese excellent traditional culture based on AR technology, and concluded that contextualized teaching based on AR technology helps to enhance students' interest in learning, and has a facilitating effect on the teaching of Chinese excellent traditional culture.

Referring to the above findings, this study attempts to integrate AR technology into the teaching of Chinese mythology, expecting that it can similarly enhance students' vocabulary memory and cultural content understanding, and interest.

ARGBL in language teaching and learning

ARGBL is a state-of-the-art teaching method that utilizes augmented reality technology, gamification mechanics, and authentic geographic locations to create a highly immersive, interactive, and contextualized learning experience. The combination of both AR technology and gamification can significantly increase students' interest, motivation, engagement, and effectiveness (Qiaofang, 2021; Wang & Khambari, 2020). ARGBL can be a promising method to improve student learning and be more engaging than traditional vocabulary teaching classrooms (Hung & Yeh, 2023). Lu (2019) and Shaumiwaty et al. (2022) practically used AR games in an English teaching classroom to create a gamified teaching situation and found that AR educational games could enliven the classroom atmosphere, mobilize students' interest in learning, and enhance the learning experience.

To sum up, the ARGBL method is suitable to be applied in language teaching, which can effectively stimulate students' interest in learning and help teachers to create a context for their teaching.

Learning Motivation and Technology Acceptance

Motivation is an important factor that influences students' learning behavior and achievement. Thanyaphongphat et al. (2023) conceptualized six different dimensions of motivation for learning, namely:

1. Intrinsic Motivation (IM): refers to an individual's drive arising from a love or interest in the learning activity itself, emphasizing the learner's spontaneous attitude and inner satisfaction.

2. Personal Goals (PG): refers to the individual's expectation or pursuit of goals in terms of academic or personal development.

3. Extrinsic Motivation (EM): refers to an individual's drive to take action as a result of external rewards, recognition, or pressure.

4. Anxiety about Computer Science Assessment (AC): refers to a student's nervousness and apprehension about taking a test on a particular type of topic, an emotion that may affect his or her motivation to learn.

5. Self-Determination (SD): refers to an individual's ability to take autonomous control of his or her behavior and decision-making.

6. Self-Efficacy (SE): refers to the degree of confidence an individual has in his or her ability to complete a particular task or achieve a goal.

Most researchers and scholars believe that AR teaching provides learning content with novelty and interactivity, and allows learners to actively participate in the classroom through game play, which can enhance students' motivation and engagement (Hung & Yeh, 2023; Cheng et al., 2024). Qiaofang (2021) pointed out that the application of AR educational games can help students construct a gamified teaching situation, provide students with a cognitive environment for active exploration and discovery, and also help students achieve immersive and interesting learning, which can better satisfy students' curiosity and enhance learning motivation. In addition, technology acceptance is also one of the variables of interest to researchers. This paper uses the four core concepts of TAM as its theoretical framework. According to Thanyaphongphat & Panjaburee (2019), Perceived Usefulness (PU) refers to the extent to which students believe that using the developed application can improve their academic performance. Perceived Ease of Use (PEU) refers to the extent to which students believe that using the developed application is both simple and effortless. Attitude towards Use (ATU) refers to students' positive or negative attitudes towards using the developed application. Behavioral Intention (BI) refers to the extent to which students accept and expect to use the developed application in the future. The better students' perceived technology, the easier it is for them to actively participate in classroom learning (Yi et al., 2019).

In this study, learning motivation and technology acceptance were measured by questionnaires and combined with the results of cognitive assessment in order to comprehensively evaluate the pedagogical effectiveness of an AR technology-based classroom for teaching Chinese mythology.

Teaching Chinese mythology in international Chinese language education

The word “myth” does not exist in traditional Chinese texts. The word “myth” is derived from the ancient Greek word “mythos”, meaning stories or legends about gods and heroes (Zeng, 2007; Yang et al., 2005; Wei, 2020). Regarding the research on the application of Chinese mythological stories in international Chinese language education, Li (2022) takes the Chinese myth ‘Nuwa Mending Heaven’ as an example of the design of teaching Chinese as a foreign language classroom. By adding mythological elements and creating a real and vivid linguistic environment, it is believed that teaching Chinese mythological stories can increase the interest of the classroom, motivate students to learn, and cultivate students' comprehensive language skills. Wei (2020) attempted to introduce the ancient Chinese myths ‘The Cowherd and the Weaving Maiden’ and ‘Liang Shanbo and Zhu Yingtai’ into the Chinese language classroom at the primary level of secondary schools in Thailand, and concluded that the ancient Chinese myths, with their unique

charms, can play a positive role in promoting foreign learners of the Chinese language in Chinese language teaching, and that they are excellent teaching contents. However, some scholars have pointed out that there are many vocabulary words in mythological stories, and the vocabulary words are mostly abstract; the story narratives are simple, and the difficulty of understanding mythological stories is one of the difficulties in teaching and learning (Shiyun, 2021).

The case selected for this study, The Lotus Lantern, also known as The Splitting of the Mountain to Save the Mother or Cheng Xiang to Save the Mother, is a mythological tale that has been widely circulated in China. The 1999 animated version of 'The Lotus Lantern' was used as the teaching material, which is in line with the principles of cultural teaching and is easy to understand. The spirit of celebrating family love and personal growth in "The Lotus Lantern" is also in line with the spiritual and cultural pursuits as well as the ethical and moral requirements of the Thai people, and the content of the story is healthy and positive, which is in line with the cultural needs of lower secondary Chinese language learners, and is thus easier for Chinese language learners to identify with and accept (Wei, 2020; Chaomei, 2016).

Therefore, this study integrates AR technology into the teaching of myths, making the story content interesting. Not only can it break through the dilemma of 'difficult to understand and lack of interaction' in traditional mythological teaching and make the abstract mythological stories concrete and visible, but it also stimulates students' interest in learning and enhances their sense of immersion and participation, which makes this study of certain pedagogical value.

■ Methods

The purpose of this study was to investigate the feasibility and effectiveness of incorporating AR technology in the teaching of Chinese mythology. By using a single-group pre- and post-test design, an AR-assisted teaching intervention was conducted for students in the experimental group. The next section describes the experimental process in detail.

Participants

The research subjects were 31 students from a K-12 Chinese language class at a school in Chiang Mai, Thailand. After communicating with the teacher responsible for Chinese language instruction in the class, it was confirmed that all participants had basic Chinese listening, speaking, reading, and writing skills. The inclusion criteria were: 1) students enrolled in the Chinese language class; 2) voluntary participation in classroom activities and completion of experimental tests and questionnaires.

Experimental Procedures

This study is a classroom teaching study. All teaching and assessment activities were conducted during regular course activities and did not involve any personal privacy or additional risks for students. The

study strictly adhered to the school's teaching management regulations and was fully explained to the teaching staff and the school management department before implementation, obtaining their consent. All participants were informed and participated voluntarily. The data was anonymized and did not affect academic performance.

This study adopted a single-group design. To reduce bias and testing effects, the following measures were taken: 1) The teaching content and process remained consistent with regular classrooms, with only the addition of new technology applications; 2) The learning motivation and technology acceptance questionnaires were administered only once after the experiment to avoid learning effects or fatigue effects caused by repeated testing.

First, students took a pre-test (40 minutes) to assess their mastery of basic vocabulary and mythological knowledge. Next, teachers conducted Chinese mythology teaching activities based on AR technology in the classroom (120 minutes). After completing the teaching course, students took a post-test (40 minutes). In addition, students completed a questionnaire (10 minutes). Finally, semi-structured interviews were conducted with some students and teachers (5 minutes per person). By comparing pre- and post-test scores and combining questionnaire and interview feedback, the effectiveness of AR-based teaching was evaluated. A summary of the experimental procedure is shown in Figure 1.

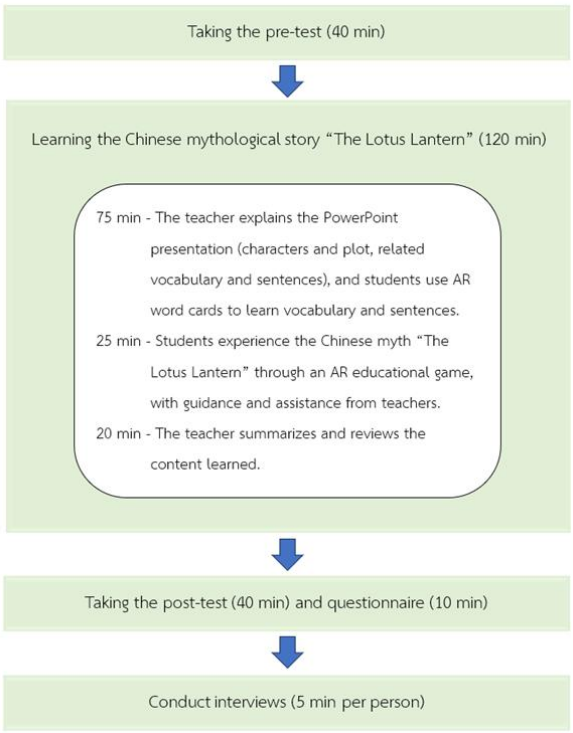

Figure *1*. Experimental Procedures

Instruments and Data Collection

To assess the effectiveness of teaching and learning, three research instruments were developed and designed for this study as follows:

Learning achievement test questions

The test consists of two main parts: an oral test and a written test. The oral test consists of two parts: reading Chinese aloud and answering questions. It mainly examines whether students have a correct grasp of the pronunciation of the words they have learnt and how well they understand the storyline, and is worth 50 marks. The written test is modeled on the HSK Level 1 paper and is divided into two parts: listening and reading, with a full score of 50 points. The total test score is 100 points. The test included the vocabulary of the HSK Level 1 syllabus and the teaching of the Chinese mythological story 'The Lotus Lantern'. The difficulty and content of the questions in the two tests are roughly equal to ensure the fairness of the measurement results.

Questionnaire Scale

The questionnaire was designed on a five-point Likert scale, which usually contains five options ranging from '1: Strongly Disagree' to '5: Strongly Agree' to reflect the level of attitude or agreement. Divided into two main parts, the first part was the Learning Motivation Scale with a Cronbach's alpha of 0.949. Content validity was 0.85 after review by three experts (26 questions, 6 dimensions, including: Intrinsic Motivation (IM), Personal Goals (PG), Extrinsic Motivation (EM), Anxiety about Computer Science Assessment (AC), Self-Determination (SD), and Self-Efficacy (SE)). The second part was the Technology Acceptance Scale, with a Cronbach's alpha of 0.938. Content validity was 0.95 after review by three experts (based on the TAM theory, 14 questions, 4 dimensions, including Perceived Usefulness (PU), Perceived Ease of Use (PEU), Attitude Towards Use (ATU), and Behavioral Intention (BI)). The Cronbach's alpha for the entire questionnaire was 0.969, indicating excellent internal consistency reliability. After review by three experts, the content validity was 0.88, indicating that the question items effectively responded to the research objectives.

Interviews

The format consisted of semi-structured one-to-one interviews, conducted with five students and one Chinese teacher, who were randomly selected. The interview outline is designed based on the students' learning situation and the content to be supplemented by the questionnaire survey. There are five questions for students and four questions for teachers, with each person having five minutes.

Teaching Activity

The AR tools used in this study include word cards and educational games, which are both related and can be used independently. Word cards are primarily used for vocabulary learning, helping students gain an initial grasp of vocabulary and laying the foundation for subsequent AR game-based learning; educational games further deepen students' understanding and memory of vocabulary and story plots through task-based and contextualized approaches. This design aligns with the 'step-by-step progression' learning mechanism outlined in ARGBL theory, helping students enhance their comprehension and retention

of vocabulary and mythological stories. It also positively impacts their listening, speaking, and reading skills, while offering flexibility for application across various teaching scenarios.

Web AR-based Chinese Word Card Application

This teaching activity aims to enhance students' understanding, memory, and application of Chinese vocabulary through AR Chinese Word Cards created by the Zappar platform. The platform supports Web AR technology. Students can use Google Chrome on their mobile phones or tablets to directly scan the QR code to trigger the AR content without installing any apps. As shown in Figure 2, each AR word card contains the following core content: Chinese characters, pinyin, and definitions, standard pronunciation, stroke order animation, illustrations, example sentences, and interactive exercises (with feedback on correct or incorrect answers). During the teaching process, students can repeatedly listen to standard pronunciation to improve their phonetic perception skills. Teachers will also guide students to imitate and repeat the pronunciation, thereby providing them with initial oral training opportunities in the classroom. It creates a fun and interactive learning environment for students and helps them to achieve an effective connection between learning inside and outside the classroom.

Figure *2*. Example of AR Word Cards

AR Educational Game Application Based on the Chinese Myth 'The Lotus Lantern'

The AR educational game in this study was designed and developed based on the Construct3 and Illustrator platform technologies, supporting cross-platform browsing access. As shown in Figure 3, students do not need to download any applications. They only need to enter the designated URL through Google Chrome, log in using the unified account and password distributed by the teacher, and they can start playing the game. Using the Chinese mythological story "The Lotus Lantern" as the carrier, vocabulary learning is integrated into the mythological story. Covers the three skills of listening, speaking, and reading, as well as important learning skills such as observation and logic. As shown in Figure 4, the game is divided into three levels, with tasks designed progressively to effectively guide students through to the language output stage. In terms of listening, students enhance their speech recognition and comprehension skills through repeated

exposure to standard speech inputs in the AR environment. In terms of speaking (see Figure 5), the word cards and game tasks included a shadowing component. Although no immediate feedback was provided, this effectively promoted students' oral expression and fluency in an immersive environment. In terms of reading, students identify and read texts in the AR environment, deepening their memory and understanding of vocabulary and plot through interaction with the virtual environment. Most of the students gave positive feedback after the experience, saying that “the game is interesting” and “it helps to memorize the words and understand the story”, which effectively enhances the learning effect and sense of cultural identity.

Figure *3*. Example of AR Game Login Page

Figure *4*. Example of Select Game Level Page

Figure *5*. Example of Shadowing Task Page

■ Results and Discussion

By the research questions, this study explored the changes in students' learning achievement before and after experiencing AR technology instruction, as well as their overall performance in motivation and technology acceptance. The results of the experiment are analyzed below.

Results of Learning Achievement

In order to examine the effect of AR technology-assisted myth teaching on learning achievement, this study used a paired-samples t-test to statistically analyze the pre-test and post-test scores of the students in the experimental group. As can be seen in Table 1, the mean of the students' pre-test scores was 65.10 (standard deviation = 14.835) and the mean of the post-test scores was 77.32 (standard deviation = 13.671), with an average improvement of 12.226 points. The results of the paired-samples t-test showed a highly statistically significant difference of t = -7.676, $p < 0.001$. This result indicates that AR technology-assisted myth teaching significantly improves students' academic performance. According to this data, it can be initially concluded that AR technology-assisted myth teaching has practical application value in enhancing learning outcomes.

Table 1.

T-test of the Learning Achievement

Test	Mean	S.D.	Mean difference	*t*	*p*
Pre-test	65.10	14.835	-12.226	-7.676	< 0.001
Post-test	77.32	13.671			

** $p < 0.01$

Results of Students' Learning Motivation and Technological Acceptance of AR-Based Technology for Teaching and Learning Chinese Mythology

To further understand students' levels of learning motivation and technology acceptance in the application of AR technology in Chinese mythology education, this study employed descriptive analysis to statistically analyze the scores across various dimensions. As shown in Table 2, in terms of learning motivation, students demonstrated high average scores across all five dimensions (all means exceeded 4.3). The average score for “extrinsic motivation (EM)” was 4.52, and for “intrinsic motivation (IM)” it was 4.51, indicating that students possess both intrinsic interest in learning and extrinsic motivational drivers when participating in instructional activities. However, the mean score for “Computer Science Assessment Anxiety (AC)” was 3.76, indicating that students generally exhibit high levels of anxiety in computer assessments, which may, to some extent, affect their trust and acceptance of technological tools.

As shown in Table 3, in terms of technology acceptance, the average scores for all four dimensions were above 4.3 points. Among them, the average score for “Attitude Toward Use (ATU)” was the highest (4.57), followed by “Perceived Usefulness (PU)” and “Perceived Ease of Use (PEU).” This indicates that students hold a positive attitude toward the integration of AR technology into teaching as a whole and recognize its practical value and convenience. This further supports the research hypothesis that the

integration of AR technology in a mythological teaching classroom not only enhances students' academic performance but also increases their motivation and willingness to use the technology.

Table *2*.

Descriptive Data of Students' Learning Motivation

Dimension	N	Mean	S.D.
IM (Intrinsic Motivation)	31	4.51	0.49
PG (Personal Goals)	31	4.46	0.66
EM (Extrinsic Motivation)	31	4.52	0.61
AC (Anxiety about Computer Science Assessment)	31	3.76	0.67
SD (Self-Determination)	31	4.47	0.69
SE (Self-Efficacy)	31	4.43	0.66

Table *3*.

Descriptive Data of Students' Technological Acceptance

Dimension	N	Mean	S.D.
PU (Perceived Usefulness)	31	4.51	0.68
PEU (Perceived Ease of Use)	31	4.48	0.70
ATU (Attitude Towards Use)	31	4.57	0.58
BI (Behavioral Intention)	31	4.30	0.67

Results of correlation analysis between Learning Motivation and Technology Acceptance

In this study, Pearson's correlation analysis revealed a significant positive correlation ($p < 0.01$) between all learning motivation dimensions and technology acceptance dimensions, indicating that the higher the students' level of motivation, the higher their acceptance of instructional technology, and that the two are closely related.

As in Table 4, the strong correlations between intrinsic motivation and personal goals ($r = 0.896$) and extrinsic motivation and self-efficacy ($r = 0.888$) show that students are not conflicted between interest-driven and performance-oriented, and that extrinsic motivation contributes to confidence and self-identity.

Among the technology acceptance variables, the significant correlation between perceived usefulness and perceived ease of use ($r = 0.829$) validated the TAM theoretical model, suggesting that students perceived the technology to be helpful as well as easy to operate.

Behavioral Intention (BI) was significantly correlated with self-determination (SD, $r = 0.662$) and attitude towards use (ATU, $r = 0.518$), but not strongly correlated with the other variables, suggesting that students' willingness to use the technology consistently depended more on their subjective willingness and

personal attitudes than on technological characteristics or external motivations.

Table *4*.

Pearson's Correlation between Learning Motivation and Technology Acceptance

Dimensions	IM	PG	EM	AC	SD	SE	PU	PEU	ATU	BI
IM	1	0.896**	0.744**	0.599**	0.728**	0.733**	0.669**	0.625**	0.661**	0.562**
PG	0.896**	1	0.755**	0.562**	0.832**	0.761**	0.727**	0.687**	0.699**	0.583**
EM	0.744**	0.755**	1	0.480**	0.760**	0.888**	0.818**	0.846**	0.772**	0.427*
AC	0.599**	0.562**	0.480**	1	0.601**	0.486**	0.637**	0.578**	0.495**	0.448*
SD	0.728**	0.832**	0.760**	0.601**	1	0.769**	0.867**	0.800**	0.799**	0.662**
SE	0.733**	0.761**	0.888**	0.486**	0.769**	1	0.789**	0.792**	0.752**	0.576**
PU	0.669**	0.727**	0.818**	0.637**	0.867**	0.789**	1	0.829**	0.793**	0.438*
PEU	0.625**	0.687**	0.846**	0.578**	0.800**	0.792**	0.829**	1	0.738**	0.496**
ATU	0.661**	0.699**	0.772**	0.495**	0.799**	0.752**	0.793**	0.738**	1	0.518**
BI	0.562**	0.583**	0.427*	0.448*	0.662**	0.576**	0.438*	0.496**	0.518**	1

** $p < 0.01$, * $p < 0.05$

Interview analysis

In order to deeply study the impact of AR technology in the classroom of teaching Chinese myths, this study randomly selected five students for interviews, analyzed and summarized the following conclusions: AR technology plays a significant role in teaching Chinese myths and learning the Chinese language. Students generally believed that AR technology could help memorize vocabulary and master correct pronunciation, and understand story content and cultural connotations. The following learning feedback was received and translated from the interviews:

“AR technology helps us memorize words easier and faster”, “Through the Chinese mythological story “The Lotus Lantern” I learnt about a mother's love for her child, Chen Xiang's bravery and perseverance, and that by using AR technology I can memorize words more easily and learn correct pronunciation ”, “Through the mythological story I got good inspiration and learned the wisdom of Chinese culture, and after experiencing the AR technology, I can also remember the words more easily, understand the content, and be more motivated to learn”.

AR technology can display virtual characters or word pictures in the real world, creating a more realistic learning environment. Experiencing AR word cards and educational games, and being able to listen to words or learn them repeatedly at any time, is more innovative and interesting than traditional teaching, and can stimulate students' interest in learning and promote independent learning. The following learning feedback was received and translated from the interviews:

“In an AR classroom, one will understand and learn more than in a regular classroom”, “The animated content in an AR classroom will be more interesting and challenging than in a regular classroom”,

“A classroom using AR technology can listen to Chinese words at any time without relying on the teacher to help with pronunciation, whereas in the previous classroom we had to let the teacher teach us, which we sometimes found inconvenient”.

Finally, all respondents indicated that they would like to continue to use AR technology to learn Chinese in the Chinese classroom in the future. The following learning feedback was received and translated from the interviews:

“I would like to use AR technology to see real images in the future so that I can learn Chinese faster”, “I am very interested because there is a lot of cultural knowledge in China that is worth exploring and learning”, “I hope that AR technology can bring fun and convenience to learning in the future”.

This study also interviewed the teacher responsible for teaching Chinese in this class and analyzed and summarized the following conclusions: Teachers are also very keen to incorporate AR technology into their classrooms, believing that AR technology plays an important role in students' learning and skill development. Not only does it stimulate students' interest in learning, but it also increases their class participation. This teaching method should continue to be developed and promoted in the future. The following learning feedback was received and translated from the interviews:

“This AR technology-assisted Chinese language teaching has achieved the expected results. Thanks to the addition of new technology, students became more interested in learning. Compared with traditional teaching methods, students were more engaged, competitive, and cooperative. I would very much like to incorporate AR technology in the classroom and in my work. This way of teaching and learning deserves better.”

Discussion

This study explored the effectiveness of AR technology in teaching myths in international Chinese language education. The results showed that significant improvements were demonstrated in both academic performance and motivation, and technology acceptance.

First, regarding learning outcomes, students’ post-test scores were significantly higher than their pre-test scores, suggesting that AR-assisted instruction exerts a substantial positive influence on academic performance. This finding aligns with recent research on the application of AR in language learning. For instance, some studies have shown that AR technology not only helps improve students' academic performance but also enhances the visualization and contextualization of story content through three-dimensional images and dynamic scenes, thereby reducing comprehension difficulties and increasing students' learning interest and engagement (Fangfang, 2016; Yayin, 2022; Cheng et al., 2024). However, the performance improvement cannot be entirely attributed to the auxiliary role of AR technology. Other explanations are also worth considering, such as the familiarity effect brought about by repeated practice, the novelty appeal of AR activities themselves, and the additional guidance and support provided by teachers in the classroom. Therefore, future research should introduce control groups, delayed tests, or

multi-round experiments to further exclude and verify its stability.

Secondly, the research results show that students demonstrated high levels of learning motivation and technology acceptance. Based on the four core constructs of TAM, the following analysis and summary were made:

1. Perceived Usefulness (PU): Students generally believed that AR technology-created game scenarios could effectively support vocabulary memorization and understanding of mythological contexts, and that they enhanced classroom engagement and interactivity, indicating their recognition of the tool's contribution to learning objectives. High scores reflect the role of PU in enhancing learning motivation and positive learning experiences.

2. Perceived Ease of Use (PEU): Results show that most students find AR tools easy to operate, with clear and understandable game level instructions, enabling them to adapt quickly. This suggests that PEU has a positive influence on student acceptance, further explaining their willingness to remain engaged in learning.

3. Attitude Towards Use (ATU): Students generally have a positive attitude toward using AR tools and are willing and proactive in using them to learn Chinese. This positive attitude is positively correlated with a significant increase in learning motivation, indicating that ATU acts as a bridge between technology acceptance and learning effectiveness.

4. Behavioral Intention (BI): Most students expressed a willingness to continue using AR technology for learning in the future, demonstrating the potential of AR tools to stimulate sustained learning interest.

From the perspective of the Technology Acceptance Model, when students have a more positive attitude towards AR activities and perceive the usefulness and ease of use of the technology tools, they are more willing to actively participate in class, thereby enhancing their learning motivation. This aligns with the findings of several recent studies, such as those by Qiaofang (2021), Hung & Yeh (2023), and Cheng et al. (2024), who noted that AR technology/ARGBL methods offer rich content visualization and interactivity, creating gamified teaching scenarios that engage learners in the classroom through simple and fun gameplay, thereby enhancing their learning motivation. This further demonstrates the potential value of AR technology in enhancing motivation and learning outcomes, which aligns with the findings of this study.

Finally, the results of the Pearson correlation analysis showed that learning motivation was significantly positively correlated with all dimensions of technology acceptance, indicating that students' psychological factors, such as learning interest, autonomy, and self-efficacy, are closely related to their positive attitudes toward AR technology. Specifically, as students' technology acceptance increases, their levels of learning motivation also correspondingly increase. This suggests that technology acceptance is not only a prerequisite for influencing learning motivation but may also be a factor promoting learning outcomes. This finding supports the integrated framework based on TAM theory and the ARGBL method, namely: technology acceptance ⟶ enhanced learning motivation ⟶ improved learning outcomes.

In summary, the AR-based Chinese mythology teaching activities designed in this study not only achieved significant results in knowledge acquisition but also enhanced students' motivation and willingness to accept technology. This provides empirical support for the introduction of innovative teaching

technologies in international Chinese language education. In practice, teachers can learn from the design of this study to develop more Chinese teaching resources based on AR technology, innovate Chinese classroom models, and enhance the attractiveness and effectiveness of international Chinese language education.

■ Conclusion

Based on the empirical results of this study, the following conclusions can be drawn: using augmented reality technology to teach myths in the Chinese as a foreign language classroom significantly improves students' performance, stimulates learning motivation, and results in a good evaluation of technology acceptance. AR technology makes the difficult and abstract myths vivid and interesting, enhances the learning experience, and arouses students' interest in learning and cultural empathy more than traditional teaching. The learning experience is more interesting and culturally resonant for students than traditional teaching. This study validates the potential application of AR technology in international Chinese language education and provides empirical support for understanding the relationship between technology acceptance, motivation, and effectiveness, offering useful references for teaching Chinese culture with the assistance of educational technology. In the future, we can further optimize the teaching design of AR technology, expand the application scenarios, and continuously promote the integration of information technology and international Chinese language education to provide students with a more immersive and participatory language learning environment.

■ Limitations and Recommendations

This study is subject to several limitations. First, the use of a single-group experimental design without a control group limits the ability to rule out potential influences such as learning time or test effects. Future studies could employ a randomized control group or a crossover design to more rigorously validate the effectiveness of AR-based instruction. Second, the sample size of this study was only thirty-one students, and all of them were from the same class in the same school, with low sample heterogeneity and limited generalization. In the future, the sample can be expanded to include Chinese learners with different cultural backgrounds and learning levels. Finally, the study only examined the short-term learning effects and lacked the tracking of long-term memory and literacy improvement. Future studies can include extended time tests to assess the long-term impact of AR technology-assisted myth teaching. At the same time, we can optimize and explore more AR content designs and interaction forms (such as scenario-based dialogue, multiplayer online AR experiences, and PK modes), and combine VR, MR, and metaverse technologies to develop mixed reality teaching strategies to enrich teaching methods.

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