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The Effect of Enhancing Students' Learning Motivation on Bilingual Class with Integrating Augmented Reality in a Multimodality Learning Environment

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Abstract: The purpose of this study was to explore the effect of enhancing students' learning motivation on bilingual integrative activities classes with augmented reality (AR) creative video. One hundred and six 5th grade elementary students filled in the motivation questionnaire with Likert 5-point scale after the bilingual classes were conducted, those assigned to the non-augmented reality (AR) group, and an individual AR group. For the non-AR group, students discussed the outdoor activities orally with the traditional teaching method, and the individual AR group used group work with the "AR Makr" APP to make outdoor activities videos which were created on iPad. The results showed that integrating AR enhances students' learning motivation and self-efficacy in bilingual classes in a multimodality learning environment. It is suggested that teachers can incorporate multimodalities instruction in bilingual and language teaching in order to enhance students' learning motivation on language.

Keywords: Bilingual class, augmented reality, learning motivation

1. Introduction

1.1 Bilingual Policy and Teaching in Taiwan

Recently, Taiwan has made plans to implement a bilingual language policy by incorporating English as the main foreign language. The National Development Council's "Developing Taiwan into a Bilingual Nation by 2030" serves as a blueprint for the entire education system in Taiwan. Therefore, elementary schools are attempting to integrate different subjects and teach them in English (Alessandra & Lin, 2021). The pressure for students to learn subjects in a foreign language has not decreased. A multimodality enhanced pedagogical approach contributes to the development of foreign language learners' knowledge. Song and Ng (2023) suggest that instructional multimodality design can enable students to participate in teaching activities and develop linguistic competence, which contributes to the connection between subject content and bilingual language support. Instructors can create multimodality tasks to activate students' engagement in bilingual classes and encourage them to construct their linguistic expressions. Naujok (2023) also indicated that multimodalities are used in different strategies and provide opportunities to engage students in translanguaging interaction, which is helpful for content meaning-making and language acquisition.

1.2 "Internet access in every class, and tablets for students." Policy

The Ministry of Education (MOE) in Taiwan has implemented a digital plan for elementary and junior high school students, which includes the provision of internet access in every class and tablets for students. This initiative aims to enhance digital learning and multimodalities in language teaching (Zhang & Wu, 2023). Many instructors aim to cultivate and integrate augmented reality (AR) techniques in their teaching designs based on the multimodality teaching approach (Wu, 2023).

Instructors integrate different kinds of applications on mobile devices to incorporate diverse resources into the multimodalities approach. In the present study, the "AR Makr" app, an iPad application, was used to create stories through a variety of templates and different tools (Dotson-Shupe & Mullins, 2022). ElSayary's (2022) research found that students can collaboratively create short movies with AR Makr as a positive engagement. The research also showed that teachers have higher motivation to highlight digital competency with course preparation. Asim et al. (2022) identified three domains to properly integrate technology into subject teaching: supporting the process of learning, catalyzing the acquisition of information, and communicating acquired knowledge. These domains are beneficial for implementing the findings of educational technology usage.

Therefore, e-learning has become an important teaching approach in elementary schools in Taiwan. E-learning provides students with autonomy and a multimodal environment, allowing teachers to act as mentors in their learning (Liaw et al., 2007). Harandi's (2015) study found that e-learning can positively affect higher education students' motivation. The researcher used a questionnaire to apply the results.

1.3 English Learning through Augmented Reality in a Multimodality Learning Environment

The use of augmented reality (AR) technology in English learning has increased as a language learning tool, which is important for enhancing the learning experiences of the COVID-19 generation. Previous studies have shown that AR not only increases emotions and the immersive feeling in the learning environment, but it also enhances learners' motivation and cultivates the effects of English acquisition (Yu et al., 2019). In this study, the researcher conducted students' learning through AR experiences and English-speaking outputs during outdoor activities. By completing the AR task assigned by the researcher, students were able to enhance their self-regulation strategies and cooperate with team members. Yu et al. (2023) found that integrating AR tools into learning could enhance students' self-efficacy in subject learning.

In the multimodal learning types that Moreno and Mayer (2007) had integrated in their review, students could manipulate the objects through the process in AR environment. Rather than typical learning type which is non-interactive, in an multimodality learning environment, students can build their own representation through augmented reality (Mayer, 2001; Moreno & Mayer, 2007). Different tools to enhance multimodality learning environment are supposed to build up students' knowledge and linguistic acquisition.

1.4 Aim of the Study

Building on Harandi's (2015) research, this study aims to investigate how integrating e-learning through the AR Makr APP can enhance motivation among elementary students who are taking bilingual courses for the first semester.

The main research question of this study is: ***Does integrating AR technology enhance motivation among students in bilingual classes?***

1.5 Objective of the present study

The research aims to determine whether teaching bilingual classes through e-learning and AR integration in elementary education affects students' learning motivation. The purpose of the present study is to focus on the outcomes related to the motivation of students who participate in bilingual classes taught through e-learning and AR integration in elementary education.

2. Methods

2.1 Participants

The present study included 106 fifth-grade students from an elementary school in a remote county in the middle of Taiwan. The participants were selected using a sampling method with quasi-experimental design, which randomly assigned four classes to two groups: a non-AR group (*n*= 53) and an individual AR group (*n*= 53). The sample consisted of 56 male students (52.83%) and 50 female students (47.17%), as shown in Table 1.

Table 1. *Ratio of male and female research participants*

Group	Non-AR group		Individual AR group	
	Number	%	Number	%
Male	29	54.72	27	50.94
Female	24	45.28	26	49.06

2.2 Experimental Procedure

The research, which is conducted as a quasi-experimental design, consisted of two groups: a control group, non-AR group; and an experimental group, individual AR group. Each group attended bilingual classes for one semester consisting of 80 periods. The non-AR group was taught using traditional lecture and discussion methods, while the individual AR group was taught using e-learning through the AR Makr APP, which integrated designing and creative products. The individual AR group had 8 periods dedicated to this method out of the 80 periods.

Finally, the participants completed a questionnaire that included motivation scales for both groups. Additionally, the experimental group answered written open-ended questions to collect their motivational thoughts after completing the experiment.

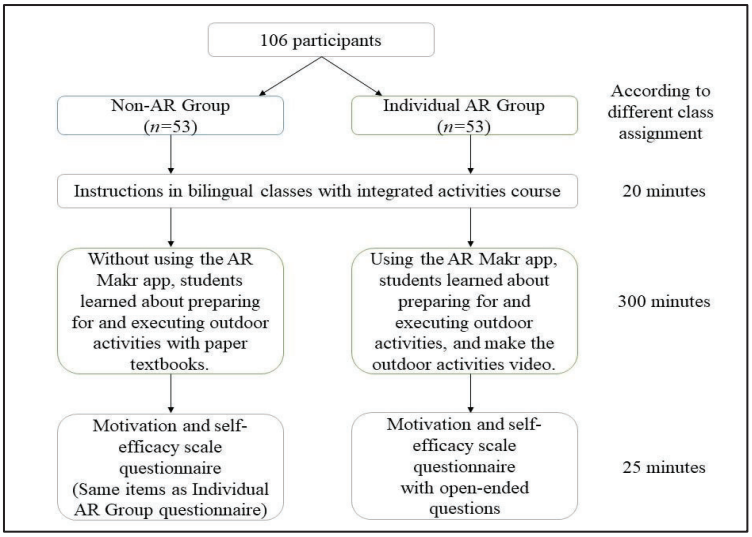

Figure 1. Experimental Procedure

2.3 Instruments

In the experimental group, individual AR group, each participant was guided to learn about preparing for and executing outdoor activities, and then create a video of their outdoor activities using the AR Makr app, which showed the function and operation of augmented reality on Figure 2 and 3. Moreover, Figures 4 and 5 show two examples of creative camping preparation videos created using the AR Makr app. In contrast, the non-AR group did not receive instruction on outdoor activities using the AR Makr app.

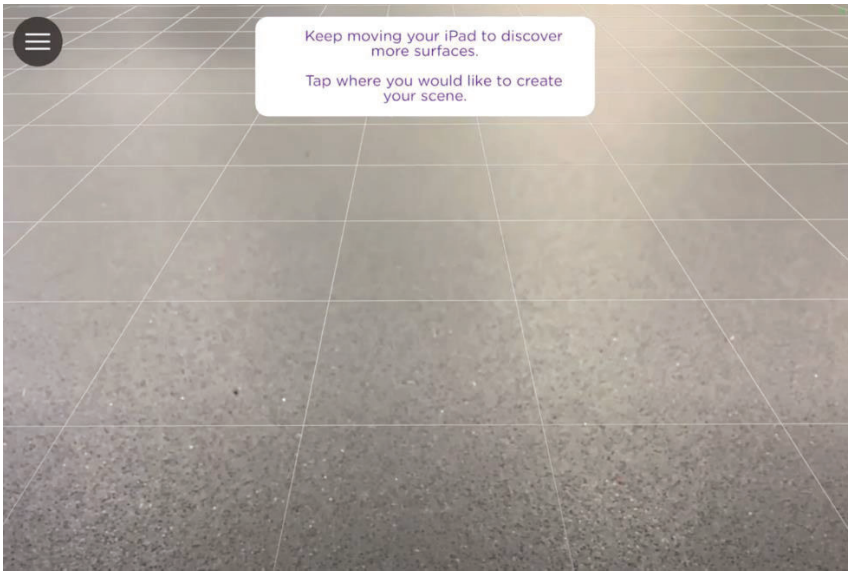

Figure 2. The function on AR Makr App (1)

Figure 3. The function on AR Makr App (2)

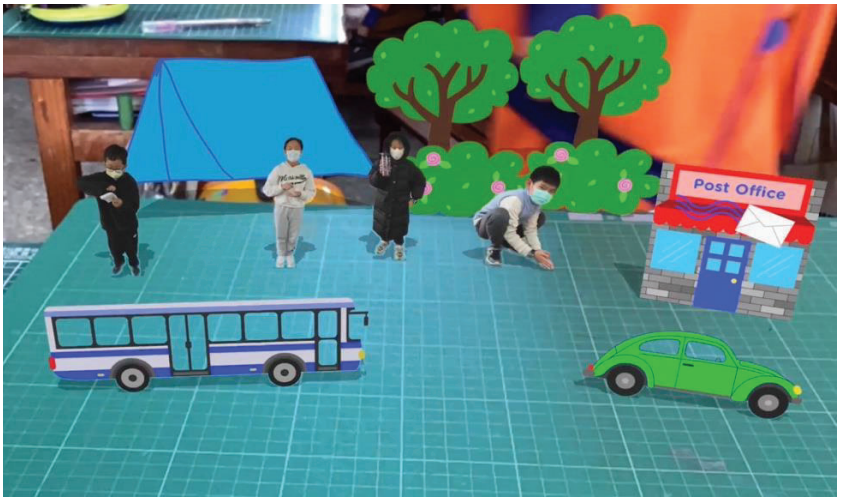

Figure 4. The example of students' creative video on AR Makr APP (1)

Figure 5. The example of students' creative video on AR Makr APP (2)

The motivation scale questionnaire, which is a self-edited questionnaire by the researcher, was used to test the hypotheses for e-learning with bilingual classes and intrinsic motivation. It utilized a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The questionnaire's reliability was measured using Cronbach's alpha (.732). The data for the present study was collected and analyzed using the statistical analysis program, SPSS Statistic 22.

The instruments used in the study included two open-ended questions about the motivation for continuing to learn bilingual classes through e-learning. The questions were: "If you would like to use the AR Makr app to learn for the next semester, why?" and "If you want the instructor to design more iPad activities, what is the reason?" Individual AR group students were allowed to list as many responses as they wanted to make their answers clear. However, non-AR groups were not asked to answer the open-ended questions.

3. Results

3.1 Motivation with bilingual classes through e-learning

The findings on Table 2 indicate positive motivation with e-learning through AR integration in the individual AR group. The results highlighted that students had higher motivation to continue with e-learning activities for the new stage of learning. Additionally, the efficacy of the activities in the experiment was also satisfactory for learning.

Table 2. *Motivation of e-learning through AR Makr APP (individual AR group)*

Items in Motivation Scale	*N*	*M*	*SD*	*SD Error Mean*
Would you like to integrate iPad activities for bilingual classes	53	4.8870	.4234	.0582
Do you like the AR Makr activities?	53	4.2698	.6381	.0876
Would you like to have iPad learning activities for next semester?	53	4.9250	.3310	.0455

3.2 Motivation with bilingual classes between non-AR group and individual AR group

According to Table 3, the mean motivation scale of the experimental group, which received individual AR, was higher than that of the controlled group, which did not receive AR. This suggests that learning bilingual classes with e-learning is more effective in enhancing motivation compared to traditional teaching methods. However, there was no significant difference between the two groups in response to the second question *"Would you like traditional teaching rather than bilingual classes?"* (*M*=2.283, *SD*= .1690), which was the reverse question.

Table 3. *Results of Motivation Questionnaire in bilingual classes through and throughout integrating augmented reality*

Dimensions	Number of Items	*N*	*M*	*SD*	*SD Error Mean*
Motivation with bilingual classes in individual AR group	5	53	4.0063	.58100	.07981
Motivation with bilingual classes in non-AR group	5	53	3.5000	.05119	.37268

3.3 Students' thoughts with learning bilingual classes through e-learning and AR Makr App

The questionnaire for the experimental group contains two open-ended questions. The purpose of this unit is to analyze the students' comments.

- *Why do you like to use AR Makr APP to learn for the next semester?*

  S16: *"There will be multimodal resources available for learning, which will make it more interesting"*

  S22: *"We can collaborate with our classmates and learn from their diverse talents."*

  S26: *I can interact with the teacher more frequently, and it creates a more joyful learning environment in our class."*

S35: *“Learning with content is enjoyable.”*

S36: *“AR learning is different from traditional classes that are stressful and pressurizing, and it motivates me to learn.”*

S51: *“I always look forward to new bilingual classes.”*

S52: *“AR allows us to explore different learning methods beyond traditional written work, and we can now learn in more active and creative ways.”*

In conclusion, using the AR Makr app to interact with classmates and teachers is a beneficial way to enhance and engage students in a positive manner, without the pressures of a traditional classroom.

- *Why do you want the instructor to design more AR Makr activities?*

S1: *“The combination of AR activities with my English learning this semester has made me excited for new learning opportunities in the upcoming semester.”*

S3: *“The AR activities provide me with more opportunities to use my creativity in creating English content. Despite my limited English proficiency, the teacher challenges and encourages me to improve.”*

S19: *“I find these types of classes to be more engaging and enjoyable. If given the opportunity, I would attend more of these classes.”*

S23: *“I find the use of multimodal class and content to be very engaging in a bilingual learning environment.”*

S24: *“I believe the teacher will create more exciting e-learning activities for us to engage in.”*

S44 *“It is important that the teacher does not force us to learn, but instead motivates us in an energetic manner.”*

S49: *“I love this type of learning because the classroom atmosphere is enjoyable and meaningful.”*

E-learning facilitates students to learn in different, energetic, and meaningful ways. Moreover, students have more opportunities to collaborate with classmates and utilize their diverse talents and intelligence while learning with bilingual content.

With e-learning, teachers act as promoters to facilitate students' autonomous learning, which has been found in research to provide more effective paths for student engagement in the class.

4. Discussion

The aim of this study is to investigate the effects of integrating augmented reality (AR) into bilingual classes and its impact on student motivation. To answer the research question, "Does integrating AR technology enhance motivation among students in bilingual classes?", a self-edited questionnaire was used to gather students' thoughts on bilingual classes and AR integration teaching. Harandi's (2015) research found that the AR Makr APP enhances students' language skills through augmented creation. Similarly, the present study showed that students had more opportunities to create an English environment meaningfully and energetically, enhancing their motivation for e-learning integration with bilingual classes.

Additionally, Yu, Liu, and Sun's (2023) research investigated the effects of integrating AR experiences and English speaking for college students. Similarly, this study found that elementary students' motivation towards English learning was raised through AR integration, with many students expressing positive thoughts on it.

5. Conclusion

The present study highlights the significant relationship between learning motivation and AR integration in the classroom through e-learning. The results specifically indicate that e-learning and AR integration can positively enhance students' motivation and learning engagement. Harandi's (2015) research on the relationship between e-learning and motivation in higher education suggests that the findings of this study can be applied to elementary education.

In summary, integrating AR Makr APP into teaching design can enhance students' different creative intelligence and talent, and even promote cooperation between classmates. The positive effects found in the qualitative data are reflected in students' responses. There is a stronger relationship between students' motivation, efficacy, and e-learning compared to traditional classroom teaching. In summary, e-learning can have an appropriate educational effectiveness on students' bilingual learning and motivation.

However, the present study only investigated bilingual teaching through AR integration as one form of e-learning. Future studies can further develop these approaches. Since the researcher mainly focused on elementary education, we suggest future studies be conducted with more participants of different ages.

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