

Easy Huayu: Mandarin For Beginners Marker-based Augmented Reality Application

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Abstract— The Mandarin language is the second most spoken language globally as of 2021. In Malaysia, the motivation to learn Mandarin as an additional language is growing as most employers list "Fluent Mandarin speakers" as part of job requirements. Mobile applications are one of the many ways to learn the Mandarin language. This research focuses on creating a marker-based Augmented Reality (AR) application, "Easy Huayu" that aims to educate the basics of Mandarin language to beginners and non-native speakers. The inclusion of AR and interactive multimedia elements in the study material will aid the users in memorizing the common phrases that can be used in day-to-day conversation. Besides that, this study also aims to analyze the effectiveness of interactive multimedia elements and AR as a tool to learn the Mandarin language. The researcher utilized the ADDIE model to approach this study, and Unity software was used to develop the application. At the end of this study, the researcher conducted an evaluation survey that returned positive feedback from the respondents. Based on the result, the users found the application to be effective in helping them learn the Mandarin language. Thus, fulfilling the objectives of this study.

Keywords—Mandarin language, Mobile application, Augmented Reality, ADDIE model

I. INTRODUCTION

According to Elbes (2016), traders who visited a foreign country would partake in knowledge and cultural exchange with the locals who spoke a different language. This indicates that language has been a bridge to lift the barriers between two or more cultures for a long time. Summer Institute of Linguistics (SIL International) stated that the Mandarin language is the second most spoken language with 1,120 million native speakers worldwide as of 2021. (Eberhard et al., 2021) Due to many employers looking for fluent Mandarin speakers nowadays, many Malaysians have started learning Mandarin as their additional language. (See & Dr. Ching, 2013)

The methods of learning an additional language have been progressing as time passes, making it easier and more accessible to everyone who wishes to learn a new language. One of the common methods to learn an additional language

is to attend a language class taught by a native speaker of the language. However, the sudden Coronavirus (COVID-19) disease that affected the entire world in late 2019 has caused most of these traditional ways of learning to transform into online or distance learning methods to abide by the quarantine rules imposed by the government. Students' learning motivation could be negatively affected by the sudden change in teaching and learning approach and the limited access to direct help and interaction with peers and teachers. (Smith et al., 2021) Fortunately, according to Jamrus and Razali (2019), many language teaching methods can be found on various platforms, including interactive mobile applications. The inclusion of Augmented Reality (AR) in study materials is believed to bring a positive impact to students' motivation in learning. The same impact is expected to be the same in language learning.

Therefore, the researcher has conducted a study to develop a marker-based AR application; Easy Huayu to teach basic Mandarin language to beginners and non-native speakers.

The objectives of this research are to:

1. To expose the usage of AR in mobile-based education in Malaysia
2. To develop a marker-based AR application, "Easy Huayu" to teach basic Mandarin language
3. To evaluate the effectiveness of Easy Huayu as a tool for learning the Mandarin language

The researcher will develop this project in the form of a marker-based AR application for mobile to teach basic Mandarin language with the help of interactive multimedia elements. The users of this application will learn basic or common phrases in Mandarin according to the chapter related to the words. The inclusion of audio features will help the users to listen and recognize the correct pronunciation of the phrases and the accurate intonation of the Chinese characters. Besides that, the interactive video will also help guide the users on the right way to write Chinese character strokes. Furthermore, the AR feature will aid users in visualizing the phrases in the form of an interactive 3D popup to encourage a

better understanding. To evaluate their knowledge after learning all the chapters, users will need to answer the quizzes in the application.

II. RESEARCH RELATED

Mobile-based education, or m-learning refers to the method of learning using mobile devices. (Mehdipour & Zerehkafi, 2013) M-learning, which is accessible through web browsers, or mobile applications is more preferred nowadays because it provides interactive and personalized learning. (McCain, 2019) According to McCain (2019), some advanced features such as Augmented Reality, Virtual Reality, and Gamification are included in many M-learning applications to follow the rapid development of intelligent technology nowadays. These interactive features can encourage students' engagement with the study material provided.

A. Case Study

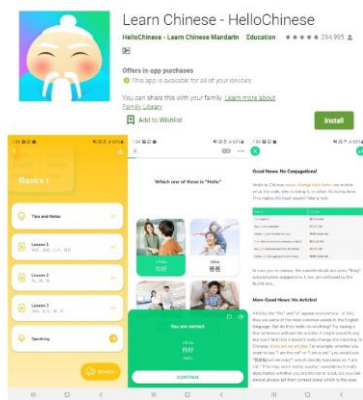


Figure 1: Hello Chinese apps

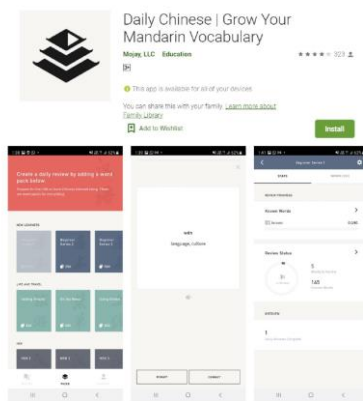


Figure 2: Daily Chinese apps



Figure 3: Learn Chinese Mandarin Phrases apps

	CS1	CS2	CS3	Proposed Project
App Name	Hello Chinese	Daily Chinese	Learn Chinese Mandarin Phrases	Easy Huayu
Platform	Android	Android	Android	Android
Content	Mandarin vocabulary, grammar, simple sentences, MCQ quiz, writing practice	Mandarin vocabulary, question-based learning	Mandarin vocabulary and simple sentences	Mandarin vocabulary, grammar, simple sentences, MCQ quiz, AR quiz
Interface	Bright and colourful design, readable font	Simple design, user-friendly, small fonts, minimal colours	Simple design, bright colours for home page	Simple design, bright and warm colours, readable font
Strengths	Interesting colors and graphics, include all multimedia elements	Easy to navigate, simple teaching method	Interesting graphics, included audio, easy to navigate	Easy to navigate, include multimedia elements, interactive AR
Weakness	Confusing navigation, requires internet connection	Include audio only, requires internet connection	Plain design, limited learning material	Limited learning material (5 chapters only)

Table 1: Comparison of Existing Mandarin Applications

III. RESEARCH METHODOLOGY

Research methodology aims to employ the correct procedures to solve research problems systematically. (Kothari, 2004) In other words, research methodology studies the steps adopted by previous researchers to study the research problems and the logic behind them. Research methodologies can be classified into two, quantitative research methodology and qualitative research methodology.

A. Research Methods

After analyzing the strengths and disadvantages of both methodologies, the researcher has decided to employ the mixed method which is a combination of both quantitative and qualitative research methodology. This type of research incorporates multiple methodologies to obtain data through sampling, recording, analysis, and interpretation. (Byrne & Humble, 2007)

By using this method, the researcher can find the answer to the research questions; i) What are the benefits of AR in education, ii) How does AR help in improving students' motivation to learn the Mandarin language, iii) How effective is Easy Huayu in facilitating users to learn the Mandarin language. Therefore, the appropriate methods used in this study are gathering information by reviewing existing journals, conducting a case study, and distributing a questionnaire.

B. Gathering Information

To gather accurate information for this study, the researcher has reviewed existing literature and journals by other authors related to the research topic. Besides that, the researcher also installed existing mobile applications to analyze the advantages and disadvantages of the published applications and proposed project, Easy Huayu. Moreover, the researcher also refers to the Mandarin 1 and Mandarin 2 textbooks by Universiti Kuala Lumpur to gather accurate materials needed for the content development.

C. Product Development

"Easy Huayu: Mandarin for Beginners" is an Augmented Reality (AR) application developed to teach basic Mandarin language to beginners and non-native speakers of the Mandarin language. This interactive application consists of five chapters: Greetings, Numbers, Home, Food, and Colours. To develop this application, the researcher has utilized the ADDIE model (Analysis, Design, Development, Implement, and Evaluate.)

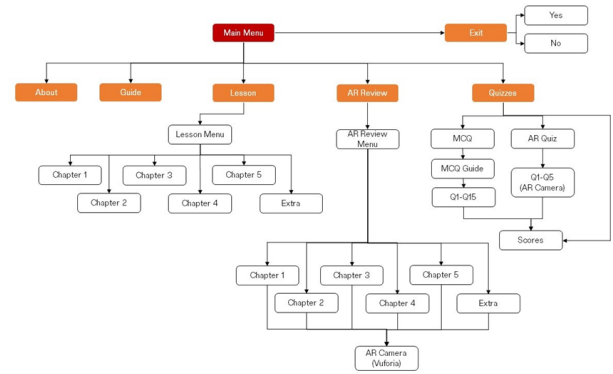


Figure 4: Sitemap of Easy Huayu application

D. Interface

The interface of Easy Huayu is simple and straightforward. Every page is designed with similar colour schemes and interactive buttons are added to make the navigation from one page to another easier for the users. Besides that, the cover of the interactive handbook is designed to imitate the traditional Chinese book. All these designs were done in Adobe Illustrator CC 2022. Finally, the AR pop-up objects in this application consists of 3D objects, static images, and videos. The users can interact with these AR elements by playing or pausing the videos or changing the colour of the objects.



Figure 5: Easy Huayu Main Menu page



Figure 6: Cover of Easy Huayu Interactive Handbook

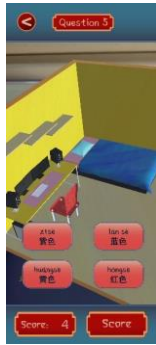


Figure 7: AR Camera in Easy Huayu application

E. Testing and Results

The researcher developed the APK file of the application and distributed it along with an evaluation questionnaire to the beta testers using Google form. A set of questions including demographic, knowledge about AR and evaluation of the prototype's functionality is given to the respondents. The target respondents chosen for this research are students from secondary and high institutions and adults, ranging from 17 to 35 years old, interested in learning the Mandarin language as an additional language.

The respondents are allowed to choose more than one answer for this question. As a result, 73% of the respondents are multilingual speakers that speak in more than two or more languages compared to the rest of the respondents that only spoke one language on a daily basis.

Do you know about Augmented Reality (AR)?
41 responses

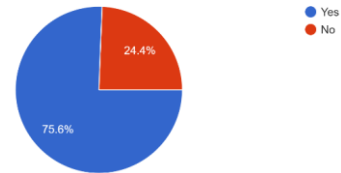


Figure 10: Do you know about AR?

If you have used AR application before, do you agree that AR can be beneficial in improving students' motivation to study?
41 responses

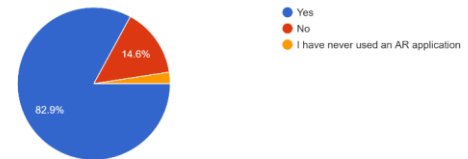


Figure 11: Do you agree that AR can be beneficial in improving students' motivation to study?

Figure 10 shows that 75.6% respondents have a prior knowledge of AR before participating in this survey. Despite that, 82.9% of the respondents agree that AR can be beneficial in improving students' motivation as seen in Figure 11.

Age
41 responses

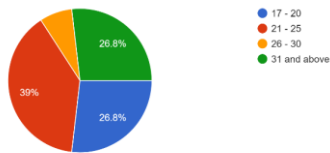


Figure 8: Age of the respondents

Figure 8 shows that 39% of the respondents are 21 to 25 years old, followed by 17 to 20 years old and 31 years old and above with the same percentage of 26.8%. Only 7.3% of the respondents are 26 to 30 years old.

The lessons are easy to understand
41 responses

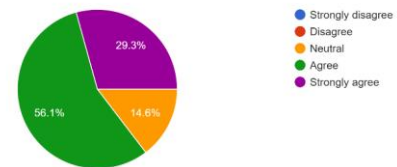


Figure 12: The lessons are easy to understand

Spoken language (may choose more than one answer)
41 responses

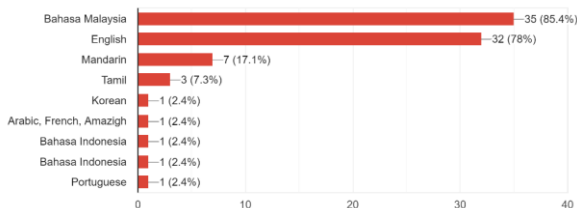


Figure 9: Spoken language

The AR elements in this app are helpful in enhancing my motivation to learn
41 responses

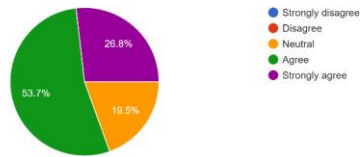


Figure 13: The AR elements are helpful in enhancing my motivation to learn

The pie chart in Figure 12 shows that all respondents agree that the lessons in Easy Huayu application are easy to understand despite. A similar result can be found in Figure 13, where all the respondents agree that AR elements in Easy Huayu are helpful in enhancing their motivation to learn.

I can memorize a few common phrases in Mandarin after using this app
41 responses

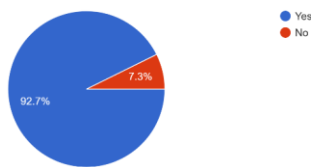


Figure 14: I can memorize a few common Mandarin phrases after using this application

Finally, the respondents were asked if they can memorize a few common Mandarin phrases after using this application, and 92.7% answered that they can memorize the phrases compared to 7.3% who could not.

IV. CONCLUSION

The pandemic COVID-19 has restrained a lot of activities in our daily lives and even forced the academic field to change their approach in teaching and learning, which in turn limiting the students' interactivity with teachers and peers. The lack of direct interactivity in the teaching and learning process has affected the students negatively. Taking into consideration the needs to encourage students' motivation in learning, the researcher has developed an AR application to teach basic Mandarin language; Easy Huayu. The Easy Huayu AR application is an interactive mobile application that includes Augmented Reality to teach the users basic Mandarin language through five chapters, which are Greetings, Numbers, Home, Food, and Colours. The application also provides two types of quizzes so that the users can test their knowledge after learning through the application. Based on the results of the evaluation test, majority of the respondents agreed that Easy Huayu is effective in helping them learn the Mandarin language, thus accomplishing the objectives of this project.

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