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Arabic-Chinese Language Mobile App for Children

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***Abstract*—The Chinese language is becoming dominant in the world due to the economic and political rise of China recently. The purpose of this paper is to help Arabic children at an early age, from five to ten years, to learn Chinese language, via a mobile application design developed to teach the basics of Chinese vocabulary, including numbers, colors, foods, clothes, events, and also common phrases, with quizzes. To improve the learning experience, this application link for learning the Chinese language and culture is configured so that every component (vocabulary or phrases) reflects the information about Chinese culture. A questionnaire was distributed to explore the expected benefits of using such applications. In addition, the presented prototype helped to identify some significant requirements to consider when designing similar mobile applications. In conclusion, this study highlights the importance of introducing cultural components when designing mobile applications for teaching a foreign language, which has vast opportunities to develop the children's personality and introduce them to universal values.**

Keywords—Arabic Language, Chinese Language, Distance education, Early years education, Foreign Language, Mobile learning

I. Introduction

Recent theoretical developments have revealed that learning a foreign language is one of the most significant factors of communication and exchanging cultures. In modern societies, it plays a fundamental role in economic growth and strengthening relations between communities. Those who learn languages play an essential role in promoting the cultural and spiritual heritage of society. Children at an early age from 5 to 10 years old have many individual and psychological characteristics that enable them to gain language and develop practical communication skills; that is why the choice of this group to teaching language was the most attention of developed countries [1].

Much research has shown that learning a new language is a useful tool to develop many new skills that contribute to forming the child's character, enhancing communication capabilities, and making relationships, reasoning skills, and raising awareness[2] . It is a fact that a child, during the first ten years of life, can learn more than he learns through the rest of his life [1]. Due to this fact, the best time to teach children a new language is from birth to the age of ten years [2].

A research study consisting of a public opinion survey conducted on 15 May 2017 from the National Center to the King Abdulaziz Center for National Dialogue [3] indicated that 91% of children in Saudi Arabia are using smart devices, 43% of these children are under five years old, and the average hours of children's daily use of mobile devices was four hours. Accordingly, the proposed application focuses on children above five years due to their ability to learn faster and retaining the absorbed knowledge for a longer time compared to adults.

Nowadays, societies seek to form a multicultural community achieved through openness to other cultures, and one of the most critical factors is teaching languages. For this reason, this work aims to develop a mobile application to assist Chinese language learning focusing on children under ten years old, and this application is developed in response to the requirements of the cultural renaissance of Saudi society these days. The purpose is to develop an application to make learning Chinese easier for children who have never studied Chinese at all. That will be achieved by using smartphones to make learning Chinese vocabulary easier, helping in creating an attractive learning environment, and enhancing learning effectiveness by assisting children in understanding the culture behind Chinese in an effortless manner.

II. Literature Review

The next subsections provide instructions on how to insert figures, tables, and equations in your document.

A. Learning Chinese Language

Learning Chinese is considered a challenging practice for non-native Chinese speakers. The Chinese language consists of over 80,000 characters [4], not like the Korean and Japanese languages. Sometimes the words in Chinese language may be composed of one or more characters, or it could be a word that makes spelling skills very complicated. Also, Chinese has both traditional and simplified characters, depending on the diverse regions of China [4]. This presents the greatest challenges of the Chinese language for learners and educators such as tones, character recognition, writing, and the lack of consistency between the character script sound. There are difficulties in the similarities of like-sounding words as well as some words with the same syllables and the same tones, but having a different meaning and different character representations, that make it so difficult to remember [5] Based on the Chinese language learning theories, the rapidly growing use of technology such as mobile learning plays an essential role in reducing efforts in the learning process [6].

B. Mobile Learning

Mobile learning or m-learning comes with several concepts. Some researchers state that m-learning allows

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students to learn while using mobile devices without considering the place and time constraints [7]. Numerous research studies were conducted to measure the effectiveness of a mobile application in the learning process, especially in terms of language teaching. One such example was using the WhatsApp application to perform an experiment in National Research Tomsk Polytechnic University to determine the impact of mobile learning in teaching a foreign language for students who had a pre-intermediate English level. Based on the final exam, the students who were under the experimental group were better than the control group. This finding can be enhanced through mobile learning, which allows the student to practice while doing the task on WhatsApp [8].

Previous studies emphasized the effectiveness of mobile application in teaching a foreign language. For example, a holographic mobile-based app is designed to help non-English speaking children. Because pronunciation is one of the most challenging skills, this application focus on using native voices plus images and interactions; it interacts with those three-dimensional robots with children. The experiment was conducted on seventy children who were divided into three groups. One group was assigned to use this application with 3D game technology. This group had better performance results compared to the other two groups [9].

Another application used a speech recognition engine to teach English vocabulary; through this application, the user can quickly identify incorrect pronunciation and gave the user the right pronunciation [10]. Word Learning-CET6 [11] is another example that teaches Chinese college students 1274 English words; this application has an "unknown words command," which is help for the user to repeat difficult words and eliminating the words that are already known by the user. The results showed that the experiment has a positive effect on the group who use this application.

III. Related Work

The next list shows related applications that address the main features offered by Chinese language learning applications:

- **Chinese Characters First Steps** [5] created by the developers at the university with several features, including mobility, progressive learning, integrating writing, listening, reading, vocabulary building, gaming, and personalized learning. In this app, every activity consists of only ten matching questions. It had positive reviews for being suitable for beginners, due to its user interface and its role in improving different skills. The negative reviews came from the users who had technical problems with sound, tracing, or payment. The overall result of the study had positive impressions from the users of the application
- **Hanzi Swype Learning Application** [12] helps both non-Chinese and native Chinese learners to learn and practice writing Chinese characters in the correct order. The goal of this application is to make learning more fun and more comfortable for students. The application is useful in detecting any possible errors when the user writes a character in the wrong direction. Order-based errors are also covered in this application, as Chinese characters may consist of one or more strokes. Therefore, learners have to know the sequence of the stroke. Technically, the application seems handy by asking for easy to obtain requirements to run it. It requires Android OS version 2 and above. The hardware should have at least 2GB of memory and the processor is 1.5GHz or above.
- **Game Chinese Language Learning** [7] with Gamification and Using Mnemonic Method an application was developed, and designed an application based on gamification, which depends on using games in a non-game context and the mnemonic method, using peg word, keyword, and loci methods to help students learn Chinese in an enjoyable environment. The application has three types of games. Each type uses a score-based method to measure the acquired knowledge of players, making the game more interesting. The authors examined thirty students of primary school from the fourth to sixth grades in the West Jakarta area. This study presented positive results, and the post-test degree increased compared to the pre-test after playing the game. Using a learning tool like the authors' game gives a better result than traditional learning.
- **Chinese Character Learning** [13] is a mobile application to learn Chinese as a second language in a bilingual primary school using the iPod. It was developed in 2010 for university foreign exchange students to learn some basic sets of Chinese characters. The learning games module was designed as the strategy to intrinsically motivate students to spend more time learning; the greatest advantage of this application is it can be used to implement self-directed individual learning, game-based learning, and group learning, providing functionality for studying and practicing writing, listening, and speaking a basic set of Chinese.
- **Chinese Panda** [4] is a mobile application compatible with IOS and Android designed in English and multi-languages to assist children to learn Chinese characters and vocabulary while focusing on four language skills – writing, reading, listening, and speaking – that were presented in colorful images and stories. One distinct feature of the application provides collaborative games that allow users to challenge their friends in social networking such as Facebook and Twitter. Then, the score will be counted. This application would be considered as an interactive environment to be a more attractive, easy way to remember, and a self-learning resource.

IV. Application Limitations

A study was conducted by Harrer (2015) to investigate the sociocultural component in the content of teaching foreign languages to pre-school children. It highlighted limitations on creating the curricula and applications aimed to teach foreign languages to children which do not consider the sociocultural component of the content. This is significant because the primary knowledge about other countries will become a bridge to recognizing the world of other cultures, which leads to mutual understanding, and increased tolerance to differences which exist among nations [1].

The claimed limitation in Harrer's study is considered as the gap that led to propose the question of this study. Therefore, this paper aims to enhance teaching foreign languages and focus on Chinese by developing a mobile application that identifies the basic vocabulary of Chinese language such as numbers, foods, clothing, color, and events, and also including sociocultural content shown as vocabulary with pictures about their foods, clothing, and special events.

V. Purpose of the Study

The main goal of this study is to design and develop a mobile application which facilitates learning Chinese for children by presenting the chosen vocabulary material and background knowledge in the sociocultural context. This app targets children in early age from five to ten years of age to master the following knowledge and skills.

1. Knowledge
   - 1.1 The essential vocabularies.
   - 1.2 Cultural knowledge of some top sights, customs, and traditions of China.
2. Skills
   - 2.1 To use the formulas of speech etiquette in the situations of greeting people (saying hello, saying goodbye), congratulations, etc.
   - 2.2 Learn how to ask the common questions, such as "How are you?"; "What is your name?"; "How much?", etc. and how to respond appropriately.

VI. Identifying the Problem and Requirement Analysis

One of the common problems for creating mobile applications for foreign language is the problem of defining a sociocultural component of the content of teaching [1]. Research in this sphere showed that the sociocultural component of the content of teaching a foreign language to children has not yet been taken into account [1]. So, data collection and analyses phases aim to (a) determine the feasibility of using mobile applications to teach foreign languages for Saudi and Arabic children; (b) Determine the best practical method, which defines sociocultural components in the content of teaching; (c) Identify the impact of merging the Chinese learning process with its culture; (d) Assess the importance of learning Chinese by Saudi and Arabic children in the future; and (e) Gather information about user needs to better identifying system requirements.

VII. Questionnaire

This study used in an online questionnaire and was distributed to reach the most significant number of participants. There are three hundred seventy-one participants that responded to the survey. The first question discussed aimed to explore an effective way to learn a foreign language. Almost 55.5% preferred the traditional way through the school. 18.1% were in favor with the remote learning through mobile application, while 10.5% chose via the website. Other responses provided other methods, such as "watch movies, coexistence, and practice conversation with individuals of the same language."

On the other hand, parents were asked: "Have your children used a mobile application to learn a foreign language before?" The total number of responses were three hundred thirty-nine, where 50.1% of them admitted the use of a mobile phone by their children to learn a foreign language. When parents were asked to evaluate the benefits to their child from those applications, the results were average, as shown in Figure 1. Moreover, around 76% of parents supported the idea of allowing their children to gain benefits from a mobile application in learning a foreign language in their spare time, but 23.7% said the opposite.

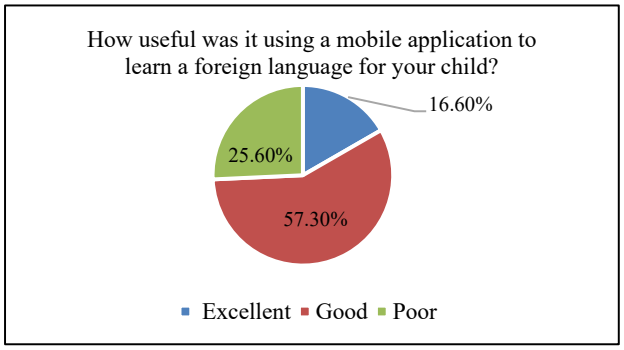

Figure 1. Evaluation of children from using mobile application

It is essential to consider the views of participants to support this project based on their requirements. The question "What do you think is the most important to learn about the Chinese language?" was asked. Learning vocabulary was the highest choice by 63.9%, while 27% think it is more significant to learn grammar. Other responses were received with different views, as shown in Figure 2. Also, the positive impacts of integrating learning the Chinese language with its culture in the learning process was agreed by 73.6%, while 26.1% did not agree.

Furthermore, 79.7% would like to use the proposed application of this project to learn Chinese, while 20.3% would not. Then, the survey asked them, "Would you also encourage your children to practice it to learn Chinese language and culture?" Most responses were in favor, at 80.3%. Many participants (61.7%) believed that Chinese language would be useful and widespread in the future due

to several reasons – as shown in Figure 3 –but 38 % did not agree.

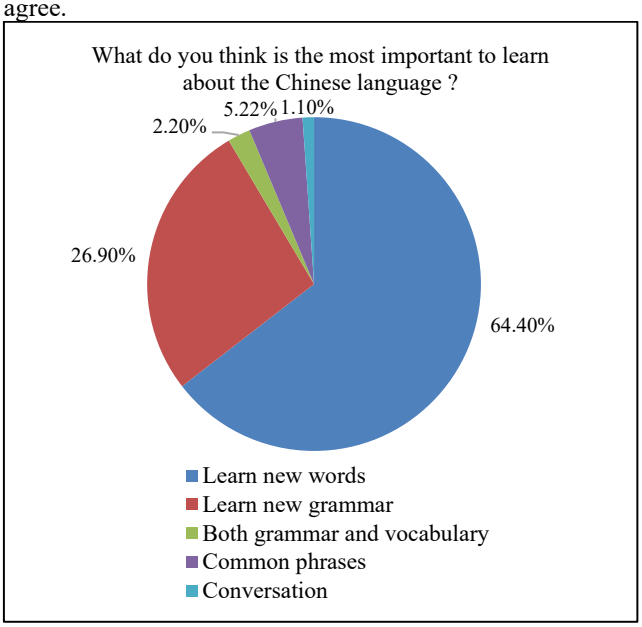

Figure 2. Most skills need to practice

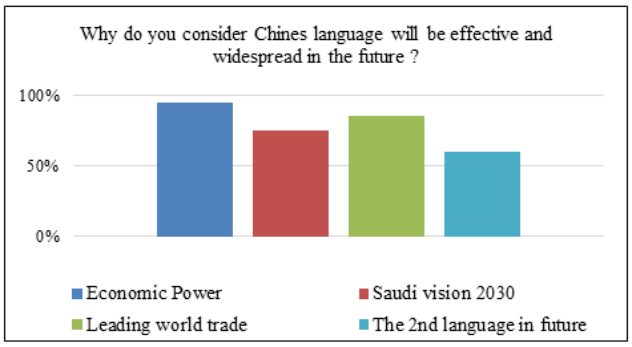

Figure 3. Participants' answers about the importance of learning Chinese

VIII. Application Design and Development

A. *Design Methodology*

The application is applying two approaches to design and presenting the proposed application:

- Sociocultural approach [1], where every component (vocabulary or phrases) reflects the information about Chinese culture. For example, clothing and food about the most popular holidays and traditions connected with their celebrations.
- Classifications approach [1], where different components that contain sociocultural content (food, clothing, events, national symbols, etc.) have been classified.

After considering the fields of children's cognitive interests and presented in both Arabic and Chinese forms, the following principles were used to choose the sociocultural content:

- Rule of typical usage, where vocabulary and phrases are reasonable for the children of this age.
- Rule of attractiveness, because image memory prevails at the children at an early age, as well as to attract the kids' attention to teaching foreign languages. The app was develop based on using visual aids (such as pictures and symbols).

With that said, the proposed application aimed to cover the following requirements:

1) Functional requirements

FR 1. The system shall choose (Start ابدأ) option to learn.

FR 2. The system shall provide the following options for the user.

FR 2.1. Choose (Categories الفئات) option.
FR 2.2. Choose (Common phrases الجمل الشائعة) option.
FR 2.3. Choose (Quizzes اختبر ذاكرتك) option.

FR 3. The system shall provide the following (Categories الفئات) list options for the user.

FR 3.1. Choose (Numbers الأرقام) option.
FR 3.2. Choose (Colors الألوان) option.
FR 3.3. Choose (Foods الأطعمة) option.
FR 3.4. Choose (Family العائلة) option.
FR 3.5. Choose (Clothes الملابس) option.
FR 3.6. Choose (Events المناسبات) option.

FR 4. The system shall provide a list of items in every option of (Categories الفئات) list for the user.

FR 4.1. The system shall display an image for all the items on the list for the user.
FR 4.2. The user shall listen to an audio sound for each word in the Chinese language.
FR 4.3. The system shall allow the user to draw letters and words.
FR 4.4. The system shall allow the user to trace letters and words by following the dotted shape.

FR 5. The system shall provide the following (Common phrases الجمل الشائعة) list options for the user.

FR 5.1. Choose (Greetings التحية) option.
FR 5.2. Choose (Questions اسئلة) option.

FR 6. The system shall allow the user to learn popular phrases in (Common phrases الجمل الشائعة) list in Arabic and Chinese language.

FR 6.1. The system shall provide audio sound for every phrase in the Chinese language.
FR 6.2. The system shall provide a written pronunciation method for every phrase.

FR 7. The system shall allow the user to take an exercise to track his/her improvement.

FR 7.1. The system shall provide an image of the word.
FR 7.2. The system shall provide four multiple-choices for the user.
FR 7.3. The system shall allow the user to choose one choice to answer the exercise.
FR 7.4. The system shall allow the user to restart the exercise when the answer is wrong.

B. User Interface Design

The main screens of the application which allow the user to select one option to start learning are shown in Figure 4. When the user selects the first option categories (الفئات), screen 3 will display.

NFR 1. The system should be easy to use by all the users.
NFR 2. The system shall be simple, so users should be able to use the application without any guidelines or help.
NFR 3. The system shall load within three seconds.
NFR 4. The system shall render its layout to the different screens sizes of the devices.
NFR 5. The system shall provide an audio sound for the user.
NFR 6. The user shall install and update the system from google play.

C. User Interface Design

The main screens of the application which allow the user to select one option to start learning are shown in Figure 4. When the user selects the first option categories (الفئات), screen 3 will display.

Figure 4. The main screens of the application

In the screen of the clothes (الملابس) category, every picture is provided in Chinese and Arabic language with traceable letters and the ability to listen to the pronunciation shown in Figure 5. Moreover, popular phrases of greeting (التحية) are displaying on screen 3.

Figure 5. The screen of clothes category and common greetings phrases

The quizzes (اختبر ذاكرتك) screens are shown in Figure 6; the first screen checks the user's knowledge through four multiple-choice options. The second screen shows if the answer is wrong where the third screen if the answer is correct.

Figure 6. Quizzes screen

D. Development Methodology

1) Application architecture

Application architecture is the highest level of representation that states the scope of an application. However, Figure 7 illustrates how the system is going to work when a user sends a request from the app to the web server, which then send queries to the database to return the requested information, and then the web server sends a response to the end-user application.

2) Workflow diagram

A visual representation of the processes in the proposed application and how the workflow moves between them is

presented in the workflow diagram, as shown in Figure 8. It shows the home page when the user starts an application. From the home page, a user has multiple options, including categories, common phrases, and quizzes. When the user clicks on the categories button, six additional categories will display (numbers, colors, foods, family, clothes, and events) and then the user selects a specific picture to start learning; also, the application allows a user to learn common phrases when choosing the common phrases button. The user could track his improvement and knowledge if he selects the quizzes button to start a quiz, and the application gives the user a result indicating if his chosen answer was correct or wrong.

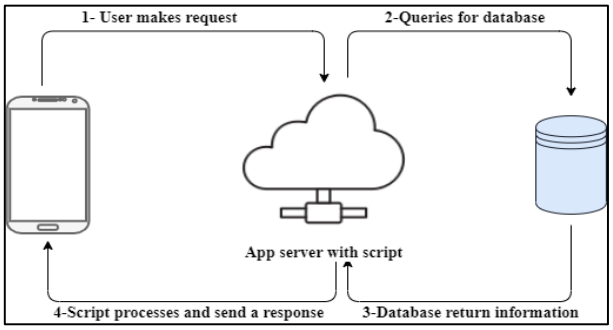

Figure 7. Application architecture

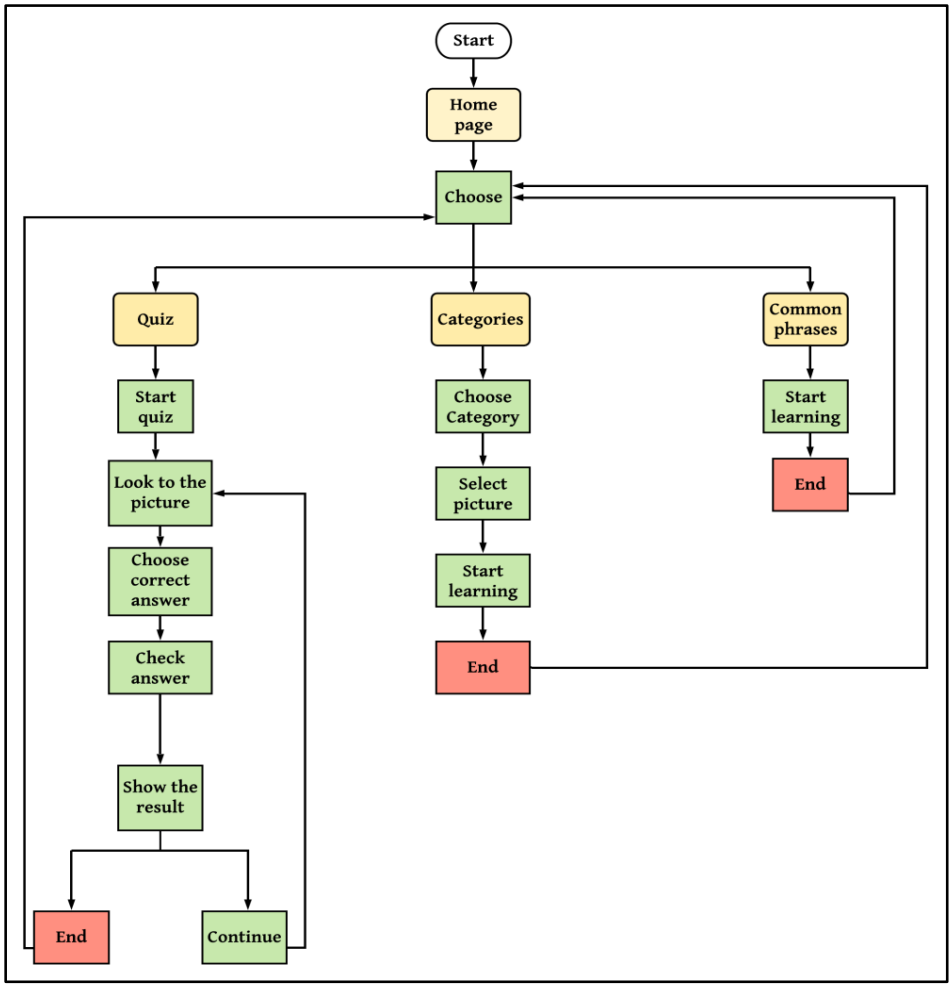

Figure 8. Workflow diagram of the developed mobile application

IX. Discussion and Research Limitations

To support foreigners in learning Chinese characters more efficiently, this study discussed the design and development of a mobile application for children at an early age (five to ten years). The proposed solution was able to collect and analyze context information and could present helpful suggestions. The questionnaire result shows that users can benefit, and they are willing to use this kind of mobile application. The proposed application aims to improves the learning experience for children by presenting the chosen vocabulary material and background knowledge in the sociocultural context, which is merging the Chinese learning process with its culture. The prototype helped to identify the main features that meet users' requirements. For example, users can practice the language by writing the word and listening to the sound to check the correct pronunciation. Users can also take short quizzes to examine

their knowledge. One of the greatest limitations of this study was in the testing phase. Due to time constraints, the researchers were not able to test the application with a large number of participants. The results of conducting the experiment using this mobile app may be affected by conducting the usability testing on a larger group that would be assessed further in future studies.

X. Conclusion and Future Work

The rapid development of modern technology using mobile applications in language learning assisted in providing a new experience of the mobile-based learning environment. In this paper, a mobile application is designed for Arabic speakers to make Chinese vocabulary learning more efficient and interesting. This application targets children in the acquisition of vocabulary background and knowledge of some sights, customs, and traditions of China. Different components of audio, pictures, and flashcards that contain sociocultural content (information about food, clothing, events, national symbols, etc.) were presented. There are still some points that need to be improved in the future. First, offering more features, such as activating the voice recognition and also dividing the app into multiple levels based on the progress level of the child. Second, improve the design of content to include short videos containing stories of the most famous heroes and traditional events of Chinese culture in both Arabic and Chinese languages.

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