

Republic of the Philippines
Western Mindanao State University
College of Computing Studies
DEPARTMENT OF COMPUTER SCIENCE
Zamboanga City



Apprabic:
Mobile Application for Learning
Arabic Letters and Numbers

A Thesis presented to the faculty of
Department of Computer Science
College of Computing Studies

In partial fulfillment of the requirements for the degree of
Bachelor of Science in Computer Science

Alnasib H. Munari
Franz Louise F. Nuluddin
Ckeanu Richer Q. Locson
Researchers

Mr. Jaydee C. Ballaho
Adviser

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Abstract

Mobile applications or systems that educate people are becoming increasingly popular since people may now learn more effectively in their homes while having fun. As a result of using technology to replace face-to-face classes with online or offline classes, there is steadiness and improvement in learning. Students can now learn effectively and efficiently by just taking their phones out of their pockets. The researchers developed an educational smartphone app called "Apprabic" to help people learn basic Arabic lessons such as writing, pronunciation, and correct arrangement of letters and numbers. By surpassing each level, users must retake the current level to unlock the next level. The player must collect points to unlock additional levels or lessons. The pre-test and post-test were carried out as part of the study's experimental research design. The t-test, a statistical technique, was used to determine whether there was a significant difference between the post-test scores result of the experimental and control groups. It implies that after employing the technology, the experimental group outperforms the control group, which used the traditional classroom setting. Students find learning and playing on mobile devices more favorable and enjoyable while earning points to learn new lessons. Anyone who wishes to learn Arabic letters and numbers, whether Muslim or non-Muslim, is welcome to try the app.

Keywords: Basic Arabic, Arabic letters and numbers, E-learning module, Educational mobile application

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CHAPTER I

INTRODUCTION

1.1 Project Context

Our project is composed of writing, pronunciation, and arranging orderly modules; in our application, the student or user will learn how to write, pronounce and put orderly Arabic letters and numbers with the assistance of our application. In our application, the write module is where the user will learn how to write by following the line for each letter or number, and the pronounce module is where the user will listen to how to pronounce the given letters or numbers. The users will be given a multiple choice to choose which options are the correct pronunciation for the given letters or numbers, and finally, the arrange orderly module where the user will learn how to arrange the given letters or numbers orderly from the right. The user can earn points by finishing each level, but to earn more points, they need to retake the current level and complete them faster because they can earn three points by finishing the level more quickly. You must earn 15 points for each level to proceed to the next level. Compared to other apps [1][2][3] that are similar to ours, they only show the given Arabic letters or numbers by just reading and listening to their audio but without interaction like the writing and arranging orderly modules in the application.

1.2 Purpose and Description

Our project aims to help users learn how to write, pronounce and arrange orderly Arabic letters and numbers. When users enroll in Madrasah schools, they already know how to write, pronounce and arrange orderly Arabic letters and numbers. It is helpful since our world is digital now. We can now learn Arabic letters and numbers on our only phone without the hassle and no internet. Our mobile application's main features are writing, pronouncing, and arranging orderly. In the writing module, the users will learn how to write Arabic letters and numbers by dragging the button and following the line in each letter or number. In the pronouncing modules, the user will listen to the given audio for each letter or number, and then they will be given three choices and choose the correct pronunciation for the given letter or number. Finally, the arranging modules, where the user will be given

random letters or numbers, and they will have to arrange them orderly from right to left. Every level will have a timer where they can earn three points if they finish faster and one point if they finish slowly. They must earn 15 points to proceed to the next level or modules.

1.3 Objectives

The study's main objective is to develop Apprabic: A Mobile Application for Learning Arabic Letters and Numbers that will help users to learn how to write, pronounce and arrange orderly Arabic letters and numbers for Madrasah students in grades 0 and 1.

Specifically, the study will:

- Create an electronic module that helps users learn about writing, pronouncing, and arranging Arabic letters and numbers.
- Design an appropriate interface suitable for children by providing the application with sound effects and background music, and a simple UI.
- Create audio recordings on how to pronounce Arabic letters and numbers.
- Develop the mobile application using Unity Engine for the scripting, Adobe Illustrator for the assets, and Filmora for editing videos.
- Evaluate the learnings of the users and the mobile app by conducting pre-test and post-test evaluations.
- Determine if there is a significant difference between the post-test result of the experimental and controlled groups.

1.4 Scope and Limitations

This mobile app covers writing, pronunciations, and arranging in order of Arabic letters and numbers. The outline is primarily intended for primary school students from Grades 0 to 1.

This study didn't cover the recitation of the Holy Quran and create words, sentences, and essays. All these lessons are taught from Grades 2 to 5. Additionally, the mobile app will not teach you how to speak Arabic.

The application is compatible only with Android Mobile phones. This study is limited to those participants from grades 0 and 1 with mobile phones enrolled in Madrasah school in Zamboanga City.

1.5 Significance of the Study

This study helped the Muslims start writing, pronouncing, and arranging orderly Arabic letters and numbers. Madrasah students with mobile phones engaged more in learning Arabic letters and numbers. This study will also open the minds of future researchers to commence a new learning tool in Arabic.

The study will be significantly affected/benefit the following:

The **students** who have mobile phones can learn on their mobile phones anytime and anywhere they want.

Parents, especially if they're busy at work, can use this application to let their children learn Arabic in the comfort of their homes.

The **teachers** can give this application to students before starting the lessons.

The **community** can use this application even if not enrolled in the Madrasah. They will have access to the Arabic letters and numbers in the app.

The **Islamic school** will have their work lessened, and they can use the app to facilitate the Madrasah students.

CHAPTER II

REVIEW OF RELATED LITERATURE

2.1 Related Studies

Since Arabic employs different letters in order and is written from right to left, it has another writing system from English. As a result, this project or idea was developed to find a means to teach young children the Arabic alphabet in a motivating and entertaining manner. By the Guarantee model, a blended lesson was created using Google Applications, an app (Nan and Lyly) for smartphones and tablets, and penmanship drills during face-to-face class meetings to help students learn and advance their skills anytime, anywhere [4].

During the coronavirus pandemic, one of the optional gadgets or tools to replace face-to-face sessions is teaching and learning using portable software (COVID-19). From March 2020 to the completion of the even semester of the academic year 2019/2020, the lecture process has been utilized. Professors and students in the courses felt a variety of barriers and obstacles. Learning Arabic as a foreign language typically involves various challenges [5].

These days, using mobile technology and devices in the educational process is quite taxing. It may be used as a distance learning environment and has much potential as a learning tool. The j-QAF learning process, particularly the Arabic and Quran learning process, continues to face challenges that this kind of technology and devices are acknowledged as being ready to address. The current method for studying Arabic and the Quran has grown less effective and appealing, especially among younger Muslims. Additionally, today's busy way of life necessitates a modern and mechanical approach prepared to improve review time and further boost the learning experience [6].

The dialect concepts should be taught and educated through a mobile vocabulary application. Learning dialect terms, especially those found in the brief surahs (parts) in Juz 30, is of the utmost importance because respondents 1 and 2 are amateurs or beginners in Quranic Arabic. Respondent 3 discovers that the easiest way to accomplish this is to

have the words recalled by engaging in various activities. He says this method benefits Qur'anic Arabic beginners and newcomers [7].

Since younger people do not utilize Jawi daily, it can be difficult and demanding for them to advance in this topic. Consideration of creative elements, such as gaming elements, should entice students or learners to research the Jawi script. In a pre-experimental one-group, a game-based mobile application called G-Jawi was developed and tested among 20 elementary school kids. The authors reviewed the pre-test and post-test to evaluate how the game's elements in the portable program affected the students' Jawi spelling ability [8].

There is an application for the Talah Arabic Writing System, another Arabic composition/writing system for people with visual impairments. Braille is the most well-known global communication system for visually impaired people. However, Arabic Braille users encounter many difficulties, notably when reading diacritical symbols similar to letters. This problem inspired Talah Abo-Alnaja to develop a new Arabic writing system where letters and diacritical marks are written as geometric shapes to make studying Arabic more enjoyable and manageable [9].

Web-based or online learning environments, like Duolingo, make it simple for users to access and discuss the subject without being constrained by time or geography. Given that Duolingo starts by demonstrating and teaching materials from the letters in sequence to the new vocabulary using pictures and visuals, this research includes recommendations for the Duolingo stage, which is crucial for learning the fundamentals of Arabic for amateur students. However, for advanced Arabic students, the Duolingo application genuinely needs to nurture component things to communicate in Arabic [10].

The study demonstrated the value and effectiveness of portable/mobile applications used in interpretation. The main gains made by students were an increase in their motivation to learn, an increase in their learning autonomy and confidence, and support for their opportunities for practice and self-learning. The current survey also demonstrates students' preferences for mobile programs used to study Arabic-Indonesian interpretation. More research can be proposed to determine how much mobile applications at higher education levels can be used successfully in a typical and new situation [11].

Mobile technologies and products are rapidly evolving and growing. This innovation will enhance cell phones' ability to introduce books, enable mobile learning, promote library research, and improve the information assortment system. Executives, employees, and students will need to adapt how they teach and study as a result of the quick access to data at any time and in any location. As technology has made the world smaller, portable learning methods are beneficial for learning modern languages and dialects. They let students communicate quickly and effectively with faculty and other students from various universities and countries [12].

In this study, the researchers developed a learning application to teach Arabic to children and illiterate Middle Easterners. Numerous instructional features are available in the program, including letter and word dictation, drawing, reading, and rehashing. Regarding convenience, the application itself is pretty easy to use and focuses on providing an excellent reading and writing experience [13].

2.2 Synthesis

Most of the mobile app that teaches users to learn basic Arabic helps them, and they learn fast compared to face-to-face learning because you only rely on the teacher and the school. So, if the teachers do not attend class or there is a pandemic or any natural disaster, there is a chance that the Madrasah students will not go to school and learn anything. That is why developers created those mobile apps to help the students learn Arabic independently. But, most of the features are not enough since they only teach users how to read, compare and identify. So, the researchers of this study wanted to solve this issue since our proposed project can guide the users on how to write, pronounce and arrange Arabic letters and numbers, which is essential in the early stage of learning Arabic.

Here some mobile apps that helps user to learn Arabic:

2.2.1. AlifBee Kids Learn Arabic

A well-known program for teaching young children Arabic is called AlifBee Kids. AlifBee Kids is based on the Entertainment Immersion Method, which teaches pupils the Arabic alphabet via entertaining and engaging stories and activities [1].

2.2.2. Learn Arabic for Beginners

For total beginners, this program is the most excellent option for learning Arabic quickly. Whether you are a beginner or an intermediate Arabic speaker, this curriculum will help you become an expert [2].

2.2.3. Learn Arabic

It has about 9000 common Arabic words and phrases and has excellent audio quality. Both students of Arabic and visitors to the nation can benefit from it [3].

Table 1: Comparison of Similar Apps

Features	AlifBee Kids Learn Arabic	Learn Arabic for Beginners	Learn Arabic	Apprabic
Learn how to write Arabic letters and numbers	X	X	X	✓
Learn how to pronounce Arabic letters and numbers	X	✓	X	✓
Learn how to arrange orderly Arabic letters and numbers	X	X	X	✓
The user can earn points in order to proceed to next level/lesson.	X	X	X	✓
The system can create multiple user/player account	X	X	X	✓
For beginner level	✓	✓	X	✓
Learn Arabic letters	X	✓	✓	✓
Learn Arabic numbers	✓	✓	X	✓
Mobile	✓	✓	✓	✓

2.3 Conceptual Framework

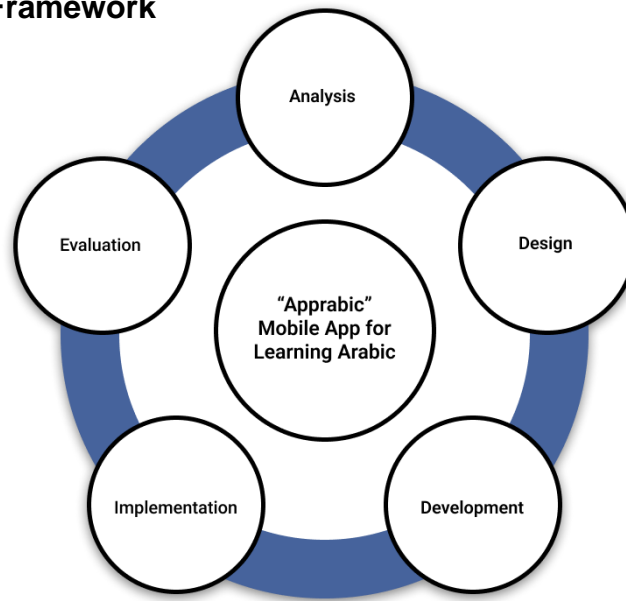


Figure 1: Conceptual Framework

Figure 1 presents the conceptual framework of this study. The ADDIE model was used in this study to demonstrate the linkages between the development stages and assess the mobile app's effectiveness. The process begins with the ANALYSIS because it provides information on how the work was planned, any gaps that needed to be filled, learning objectives, and all available delivery methods. The DESIGN is the following step, which describes the specifications and child-friendly prototype. The third section, DEVELOPMENT, summarizes how the mobile game was created, including the analysis outcomes and the design aspects. The fourth step, IMPLEMENTATION, involved using the developed mobile app with students in an experimental setting. The EVALUATION, which comes last, is where the researchers put the mobile app through its paces to see its effectiveness. The researchers administered pre-test and post-test before and after the respondents used the app. Additionally, it included a general evaluation of the generated mobile app to see whether or not it contributed to the anticipated additions or changes in the respondents' experiences.

2.4 Definition of Terms

Table 2: Definition of Terms

Term	Definition
1. Electronic Module	Because of the simplicity of navigation, the display of images and videos, and the feedback provided by formative testing, information and communication technology (ICT)-based learning materials offer interactive qualities.
2. Interface	A tool or system that allows unrelated parties to communicate.
3. Scripting	A runtime system programming language that automates the performance of operations that would otherwise be carried out manually by a human operator.
4. Assets	A thing you may use in your project or game.
5. Software	The software and other operational data that a computer uses.
6. Implementation	Execution is the process of carrying out a decision or strategy.
7. Frameworks	A device that offers pre-made elements or solutions that can be tweaked to hasten the development process.
8. Bugs	A computer program with a coding fault.
9. Database	A data store that is controlled by a database engine, ensuring the accuracy of the data and quick access to it.
10. System Architecture	A conceptual model that details the composition and operation of numerous parts and systems
11. Integration	The process of integrating tiny parts into a larger system that works as a whole.
12. ADDIE	Stands for ANALYSIS, DESIGN, DEVELOPMENT, IMPLEMENTATION, and EVALUATION.
13. Experimental Group	This is the group who used the mobile app/system.
14. Controlled Group	This is the group who used the traditional way of studying.
15. Madrasah	A college for Islamic instruction.
16. Interpretation	Explaining something's significance is a verb.
17. Statistical	The use of statistics.
18. Illustration	A design element, interpretation, or graphic breakdown of a text, idea, or procedure intended for use with print and digital publications.
19. User-friendliness	Simple to use, comprehend, or deal with.
20. Usability	The level of readiness or suitability for usage of something.

CHAPTER III

METHODOLOGY

3.1 Research Design

This study utilized an experimental research design, and there were 39 respondents for this research. Five Madrasah teachers participated in the alpha testing, and 34 grade 0 students participated in the beta testing, which included pre-test and post-test. We divided the 34 grade 0 students into two groups. The first group was called the "Experimental Group," which used the mobile app to learn Arabic letters and numbers. In contrast, the second group was called the "Controlled Group," where they took modules to learn Arabic letters and numbers the traditional way. It will show the Apprabic app's effectiveness by comparing the post-test results of the two groups.

3.2 Respondents

The respondents of this study were the Madrasah teachers and students of grades 0 and 1 in Zamboanga City. The researchers used convenience sampling in selecting participants due to the limited resources of the researchers. Grade 0 students are fitter to participate in the beta testing since the app teaches basic Arabic compared to grade 1 students with prior knowledge of Arabic topics

3.3 Data Gathering Instruments, Techniques, and Procedures

The first set of the survey questionnaire is for the Madrasah teachers and students to evaluate the developed application's design, usability, efficiency, reliability, and user-friendliness. Please see Appendix E. Each item was rated using a Likert scale of 1 to 5, with one (1) being the lowest, interpreted as "Strongly Disagree," and five (5) being the highest, interpreted as "Strongly Agree." For Madrasah teachers, the researchers asked them to check the functionalities of the system, that is, if the researchers were able to deliver all the functionalities and accomplish the completeness of the system through the acceptance testing, please see Appendix F.

Table 3: For System Design Evaluation (Five-Point Likert Scale)

RATING	VERBAL INTERPRETATION
5	Strongly Agree
4	Agree
3	Slightly Agree
2	Slightly Disagree
1	Strongly Disagree

The researchers used a questionnaire for the pre-test and post-test. See Appendix D for a sample questionnaire. The beta testers were given the questionnaire before and after using the app or module. It is intended to measure the app's effectiveness and the student's learning process.

3.4 Statistical and Analytical Tools

The statistical tools used in this study are the T-test and the measures of central tendency (median, mean, mode). The T-test is an inferential statistic used to determine whether there is a significant difference between the means of the two groups [14]. A distribution is nothing more than a grouping of data, or scores, related to a variable. Typically, these scores are shown graphically after being ranked from smallest to largest [15].

Flowchart of the Apprabic: Mobile App for Learning Arabic:

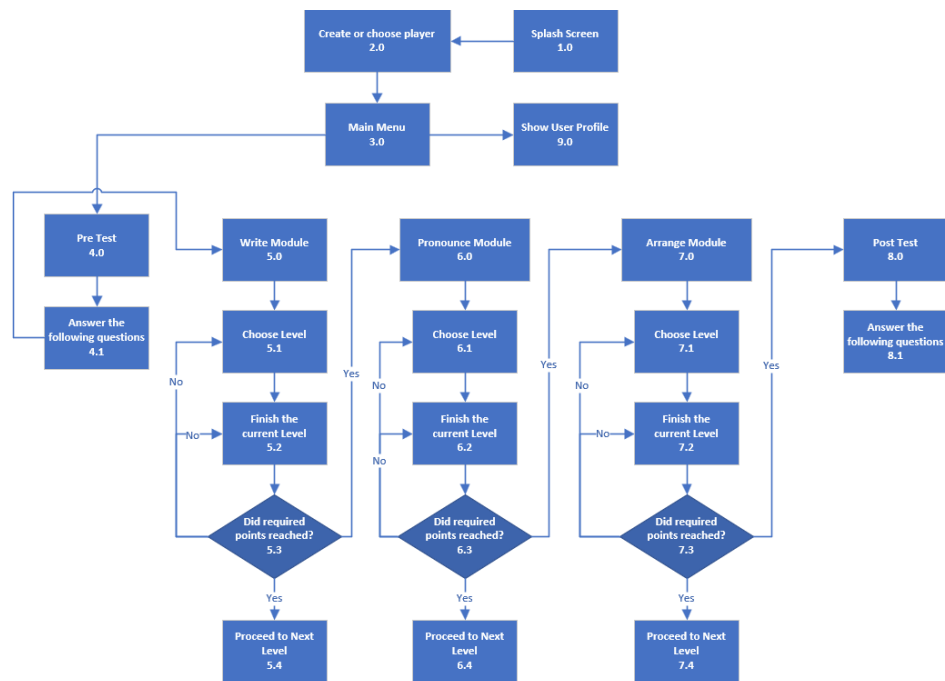


Figure 2: Flowchart of the project

3.5 Technical Tools

For the software, the researchers used Unity Engine to script the app since it has the features needed for writing, pronouncing, and arranging functions. Unity Engine is useful in creating business apps with various features. Thanks to the support of frameworks and other components, developers can find solutions using Unity Engine for problems like UI design, animation, and other challenging concerns [16]. The researchers created their assets using Adobe Illustrator since the Arabic/Islamic assets that were free in the Unity assets store were not enough. Visual artists, professional illustrators, web designers, and graphic designers worldwide utilize Illustrator to produce high-caliber artwork. Various sophisticated drawing tools in Illustrator can speed up the illustration creation process [17]. And lastly, for the recording for generating audio, the researchers used Anchor because it is free to use, and the researchers already know how to use it.

The researchers used the computer for the hardware to develop and create an asset. A microphone for audio recording was used to help pronounce Arabic letters and numbers.

3.6 Software Process Model

This study employed agile software development for the software development model. Agile approaches are tested in a dynamic setting and are shown to be very flexible by adjusting to the changes in development [18]. The agile process follows the software development life cycle: Planning, Analysis, Design, Implementation, Testing and Integration, and Maintenance. This agile method is iterative, allowing for adjustments based on customer satisfaction. Agile involves the software product gradually evolving while the client provides feedback. [19].

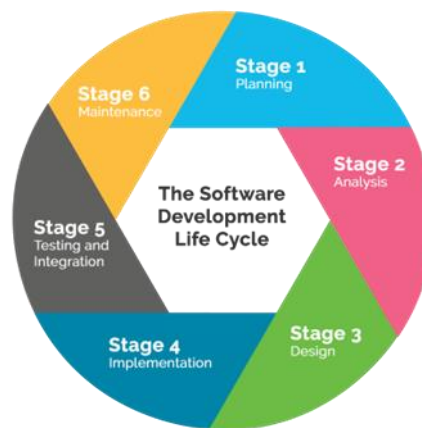


Figure 3: Agile Methodology

Planning – is the initial phase in developing the proposed project because it specifies what the system will perform or what features it will gain. Before a survey, the researchers prepared what steps to take, collected respondents' information, and created and tested their ideas.

Analysis – Following the planning phase, the researchers began analyzing the information gathered from the respondents during the survey to identify a problem-solving strategy.

Design – Following analysis, the researchers went on to create using Adobe Illustrator because they were familiar with it. It is the ideal design tool because it has many settings allowing researchers to ensure the application's design is user-friendly and straightforward.

Implementation – The system's implementation starts after the design. The researcher used the elements made with Adobe Photoshop during the design phase and scripts written in the Unity Engine. The researcher put into practice assembling the suggested program's algorithm.

Testing & Integration – Following project implementation, the researcher conducted an Alpha test to see if the application still had flaws, to ensure all the modules were working correctly, and to record all the discovered bugs. After using the Alpha testing to determine whether the application is helpful for a Grade 0 and 1 Madrasah student, the researcher will do the Beta testing.

Maintenance – The researchers tracked or managed all the errors following testing. Additionally, this stage monitored system performance, fixed errors, and made necessary adjustments.

3.7 Module Specification Worksheet

Researchers: Alnasib H. Munari

Franz Louise F. Nuluddin

Ckeanu Richer Q. Locson

Module Name: Apprabic: Mobile Application for Learning Arabic Letters and Numbers

Title: Apprabic

Description: This is a mobile application where learners can learn how to write, pronounce and arrange orderly Arabic letters and numbers.

Target Audience: Grade 0 students

Objectives:


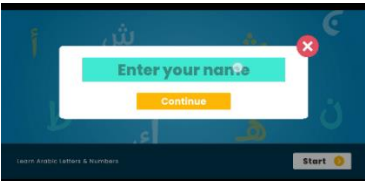
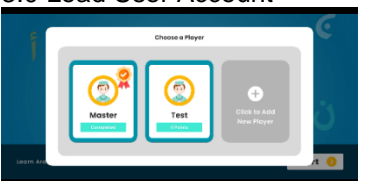




At the end of the module, the learners should be able to:


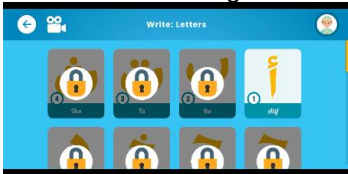
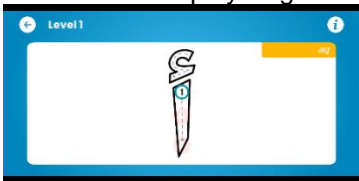
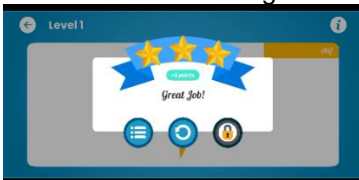



- Write Arabic letters and numbers
- Pronounce Arabic letters and numbers
- Differentiate Arabic letters and numbers
- Arrange Arabic letters and number orderly

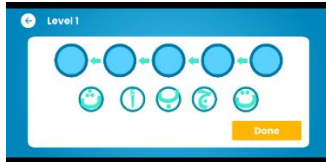
Topic Sequence:

- Writing Arabic Letters
- Writing Arabic Numbers
- Pronunciation of Arabic Letters
- Pronunciation of Arabic Numbers
- Arrangement of Arabic Letters and Numbers

Table 4: Storyboard Table

Storyboard	Visual	Interaction	Text	Audio	Animation / Video
1.0 Opening Page 	Opening Page	None	Apprabic	Used uncopyrighted music	None
2.0 Create User Account 	Create User Account Page	btnContinue Label: "Continue" Link: Goes to 4.0	Enter your name Continue	Used uncopyrighted music	None
3.0 Load User Account 	Load User Account Page	btnAvatar Label: None Link: Goes to 4.0	Choose a player	Used uncopyrighted music	None
4.0 Main Menu 	Main Menu page	btnTest Label: "Test" Link: Goes to 4.1	Test	Used uncopyrighted music	None
4.1. Test Page 	Test Page	btnPreTest Label: "Pre-test"	Pre=Test & Post-Test	Used uncopyrighted music	None
5.0 Pre-Test Page 	Pre-Test Page	btnA btnB btnC	What Arabic letter or number is this?	None	None
5.1 Pre-Test Result Page 	Pre-Test Result Page	btnMainMenu Label: "To Main Menu" Link: Goes to 4.0	Pre-Test Completed	None	None

6.0 Write Page		Write Page	btnLetters Label: "Letters" Link: Goes to 6.1	Write Letters	Used uncopyrighted music	None
6.1 Write Letter Page		Write Letter Page	btnLvl1 Label: "Alif, 2, 3, etc." Link: Goes to 6.2	Write: Letters	Used uncopyrighted music	None
7.0 Write Gameplay Page		Write Gameplay Page	btnBack Label: "Arrow left" Link: Goes to 6.1 btnInfo Label: "Info icon"	Level 1 Alif	None	None
7.1 Write Succeed Page		Win Succeed Page	btnNextLvl btnChooseLvl btnRetry	Great Job	None	None
8.0 Pronounce Page		Pronounce Page	btnLvl1 Label: "Alif"	Pronounce: Letters	Used uncopyrighted music	None
9.0 Pronounce Gameplay Page		Pronounce Gameplay Page	btnAudioA btnAudioB btnAudioC	How do you pronounce this Arabic letter or number?	None	None
10.0 Arrange Page		Arrange	btnLvl1 Label: "Arrange 1"	Arrange Arrange 1	Used uncopyrighted music	None
11.0 Arrange Gameplay Page		Arrange Gameplay Page	btnBack Label: "Arrow Back icon"	Level 1 Done	None	None



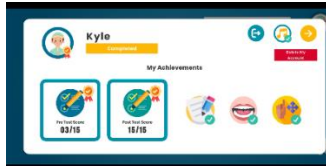
12.0 Posttest Page



12.1 Posttest Result Page



13.0 User Profile



Posttest
Page

btnAudioA

How do
you
pronounce
this Arabic
letter or
number?

None

None

btnAudioB

btnAudioC

Posttest
Result
Page

btnBack
Label: "To
Main Menu"

Post-test
Completed

None

None

User
Profile
Page

btnBack
Label: "To
Main Menu"

Name of
the User

Used
uncopyrighted
music

None

btnSignout

btnDelete

3.8 System Architecture

The system architecture we used was the 1 Tier Architecture. Because a one-tier architecture, in which the client, server, and database all sit on the same machine, is the most basic database design. One straightforward example of a one-tier architecture is installing a database on your computer and using it to practice SQL queries. However, manufacturing rarely uses such architecture [20].

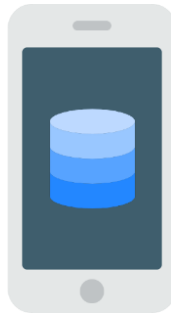


Figure 4: Tier Architecture Diagram

3.9 Implementation Plan

Once finished, the mobile app will be uploaded to the google play store or on itch.io so people can download and use it to learn Arabic letters and numbers. The mobile app is compatible only with Mobile phones and tablets with an Android version of 9.0 up to the latest. The Gantt Chart of this research can be located in Appendix A.