

## Promoting Interest in Learning Yorùbá Language Using Mobile Game

Temitope Olorunfemi<sup>1</sup>, Oladosu Oladimeji<sup>2</sup>, Olayanju Oladimeji<sup>3</sup>

<sup>1,2,3</sup>Department of Computer Science and Information Technology, Bowen University,  
Iwo, Nigeria, <sup>2</sup>Department of Computer Science, University of Ibadan,  
Ibadan, Nigeria.  
{<sup>1</sup>toprinto@yahoo.com, <sup>2</sup>oladimejioladosu@gmail.com, <sup>3</sup>oladimejiolayanju@gmail.com}

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**Abstract.** This paper describes acute areas in which technology plays a role in language and culture revitalization. It was discovered that in order for people to learn a new language, they must express interest in that language. This work presents a new way of arousing the interest of people in learning Yorùbá language through the use of mobile game thereby promoting and revitalizing Yorùbá language and culture. The mobile application was evaluated using questionnaire to selected participants who have the mobile game developed installed on their phones and explored the application, and then rated based on some criteria such as extensibility, ease of use and user interest in learning Yorùbá Language after playing the game. The results showed that 76% of respondents rated the game ease of use as above average, 70% and 90% of the respondents rated the extensibility of the game and interest in learning Yorùbá after playing game above average respectively. This technology-based application will serve as an interesting and fun-filled approach of getting people to express interest in learning native indigenous language individually and as a group.

**Keyword :** Game, mobile, learning, software

### 1 Introduction

The world is a place with diverse cultures and cultural identity depends on indigenous language. According to UNESCO, close 600 indigenous languages have vanished in the last ten decades and they continue to vanish at the rate of one language per two weeks, UNESCO also predicted that close to 90% of the world's languages are likely to vanish if this trends are allowed to continue [1]. The loss of an indigenous language denotes the loss of a cultural identity and heritage, a wealth of knowledge is lost and possibly irrecoverable. The survival of indigenous languages in this century is very challenging without the involvement of digital technology [2]. Yorùbá Language being one of the indigenous languages, it is also an endangered language [3].

Yorùbá Language is an indigenous language, spoken natively by about thirty million people in Nigeria and in the neighbouring countries of the Republic of Benin and Togo [4,5]. It has been observed there has been deterioration in the number of people that can speak Yorùbá Language fluently, which is as a result of many factors

such as adoption of colonial language or neglect of Yorùbá language from Nigeria educational system curricula [4].

In order to prevent indigenous languages from going into extinction, attention has been drawn to how technology can be used to revitalize, reclaim and support indigenous language. Video and mobile games have become one of the fastest rising and most significant form of entertainment [7], hence mobile games have a major role to play in revitalizing and preserving indigenous languages. Many works have been done to this end, like [8], designed an Android-Based Yorùbá Language Mobile E-Tutor. In which 80% of the users rated it as above average. The main purpose of the application is to cater for different categories of people that are interested in learning the basics of Yorùbá language for simple communication. Also [9], presented “ToneWars a collaborative mobile game for learning Chinese as a Second Language (CSL)”. It provides a learning experience that combines mastery learning, microlearning, and group-based interaction between CSL learners and native speakers. The game explores how special input modalities, like speech recognition and touch gestures, can improve language acquisition tasks on mobile devices. Likewise, [4] also developed a computer assisted Language learning system for Yorùbá Language, with the aim of providing digital learning environment to new and amateur Yorùbá Language learners.

However, despite what have been done, it has been observed that interest really matters, and one way to trigger interest is to capture one’s attention [6]. In order for one to learn an indigenous language, one have to develop interest for the language and identify with the cultural heritage of that language first. Similarly, along this line our aim is to develop mobile game which will promote and create awareness for Yorùbá language, in order to make people have interest in knowing and learning Yorùbá language and also identify with its cultural heritage before fully learning the language, as it has been discovered that promoting interest contribute to a more engaged and motivated learning [6].

The second section discusses the methodology used in this research, while the third sections showcases the result, followed by discussion and finally the conclusion is drawn at the fourth section.

## 2 Methods

The overall work flow of the mobile game application was modelled using the Unified Modelling Language, then system was developed using tools which includes: Unity3D which was used to design the game, C# Language was used for the game control and to handle the transfer of data from the user interface to the database and vice versa. This section entails the Pre-production stage which entails the use case diagram, the production stage which includes the database design, asset collection, source code and finally, release stage where the system was implemented.

It is a well-known fact that software development and game development share similar features in their process models, such as the need to design, develop and test software functionalities [10]. Therefore, the architecture of the mobile game for Yorùbá language consisted of three main components. These are the Mobile Game development environment, database design and software design with the use case diagram. These components are discussed in Sections 2.1 to 2.4 with the implementation described in Section 2.5.

**2.1 Mobile Game Development**

Game is seen as a kind of software with the goal to provide entertainment [11]. There are currently a wider variety of tools available for creating software and games than ever before. In order to assess potential tools the basic criteria for the software needs to be defined. The most important thing is that the software has to be interactive and feature a virtual game world with dynamic content that is animated which rules out some of the more simplistic tools for creating basic apps. Game consist of different steps which includes; Coming up with the game idea, Developing the game concept and proof of concept, Creating the prototype and then testing the game.

In order to capture people’s interest, the game idea that was concieved was a single-player non-deterministic, match 3 game. The game board can contain up to 9x9 positions. Every position on the game board contains a material which relates to food preparation in Yorùbá culture (grinding stone, pestle, mortal, etc.) and the sounds and music used for the game relates to Yorùbá cultural music which includes the use of gangan (talking drums) and bàtá.

**2.2 Database Design**

The entities used in designing database design [12] are Player and Game. Figure 1 shows the entity relationship diagram for the database. The player entity represents the player who is playing the game while the game entity represents the metrics of the game which includes score, moves, and time. The time is set in seconds, in which valid moves can be made before the allocated time runs out, the score is incremented after a valid move is made that is as the moves increases the score increases. Typically, when the time runs out the player is expected to input his/her name for highscore recording therefore, necessitating a unique identifier to identify each player i.e (player\_id) which is set to auto-increment and the primary key in the player table and foreign key in the game table.

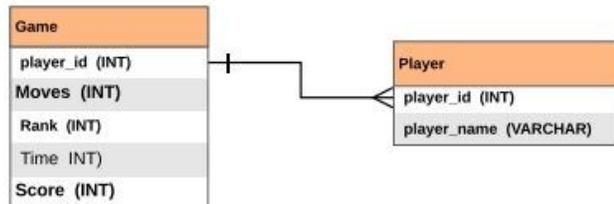


Fig. 1. Entity Relationship Diagram for The Mobile Game

**2.3 Use Case Diagram**

Use Case Diagram (UCD) is an essential artifact in systems functional requirements analysis and specification [13,14]. Use case diagrams are used during requirement elicitation and analysis as a means of graphically representing the functional requirements of the system. A use case diagram is a list of actions or event steps, typically defining the interactions between an actor and a system to achieve a goal. The use case diagram in Figure 2 shows different objects in the Yorùbá mobile Game and the actions they can perform on the system.

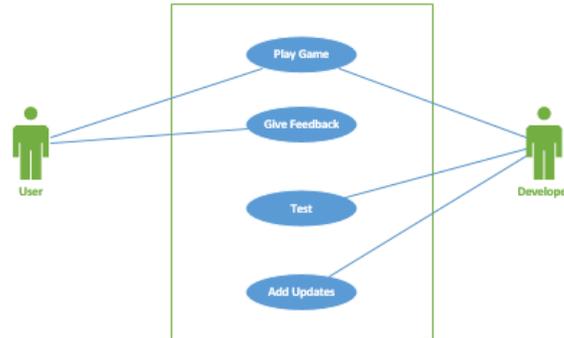


Fig. 2. Use Case Diagram for the Yorùbá Language Mobile Game.

## 2.4 System Architecture

The architecture of the proposed mobile game application as shown in Figure 3 adopts the server-client interaction approach, which requires send and retrieving of data between the user and the database. The mobile game was built using unity game engine in which android API was used to deploy to Android OS in order to enable to function on the android devices.

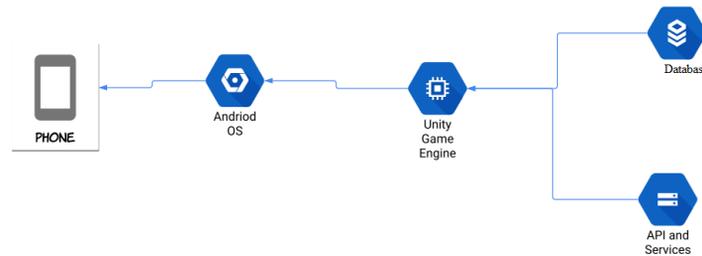


Fig. 3. The System Architecture

## 2.5 System Implementation

The system is implemented using android device as a result of the flexibility provided by mobile devices. The system has a user friendly interface which enables the users to easily understand the system functionality.

The system design was done on Unity 3D game engine due to its flexibility, drag-and-drop functionality and scripting using C#. Unity is the fastest growing and widely supported 3D game development that exists. It also allows the development of content for android along with other devices, consoles and operating systems.

The first scene for mobile is the loading bar loading the game then to the second scene which contains button in which the user presses a button to proceed, as displayed in Figure 4. The next scene is the game menu as displayed in Figure 5. In addition, the game interface whereby the player starts to play the game is shown in Figure 6. Figure 7 shows the high score list and user interface which allows user to inputs his/her name.



Fig. 4. First Scene of the Game

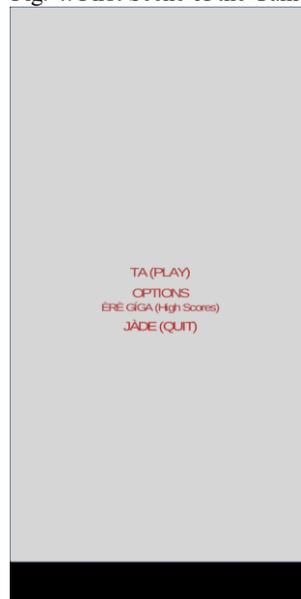


Fig. 5. Main Menu of the Game

The main menu gives the user the choice to play the game, set the game options, check the high scores in the database or quit the game. After the user will chose what to do the next interface will then be displayed based on the user's choice.

The objects displayed are stored as in the game files, are set to display randomly in 9 X 7 board. This is then played by swiping any two objects on the screen in order to change their positions to three objects that match each other. If three objects match the points are awarded else the two objects that were swapped will return to their initial positions. Also on the same interface the time(seconds), score and number of moves is displayed at the bottom left corner, top left corner and bottom right corner.



Fig. 6. The Game Board

Fig. 7 below is the next interface that will be displayed once the time is up, then the user is asked to input his/her name. Thereafter, the based on the score of the user, the rank will be assigned to the user in the interface and stored in the database. Then the user will be given the option to restart the game or go to game options.

### 3 Results and Discussion

To test and evaluate the mobile game application, the Technology Acceptance Model (TAM) [15] was adopted in order to evaluate the acceptance level in terms of extensibility, ease of use and user friendliness. Likewise, software reliability metrics were used to check how reliable the mobile game application is [16]. Therefore, there was a beta test among 50 participants (28 males and 22 females) with diverse background as shown in Table 1. The participants were required to provide feedback by answering a questionnaire. The Yorùbá Language mobile game was evaluated by allowing 50 participants, mostly university undergraduates, with little knowledge and interest of learning Yorùbá language to make use of the mobile game that has been installed on android mobile phones.

Then participants were asked to fill the questionnaire which was based on three criteria namely: extensibility, ease of use and the user's interest in learning Yorùbá Language after playing the game. The users' evaluation result is presented in Table 2 below.

Table 1: Background Details of the Participants

Proficiency/Age Range	No Proficiency/Novice	Amateur/Average	Highly Fluent
15 - 25	12	7	2
26 - 35	9	5	0
36 - 45	6	1	0
50 - 60	5	2	1

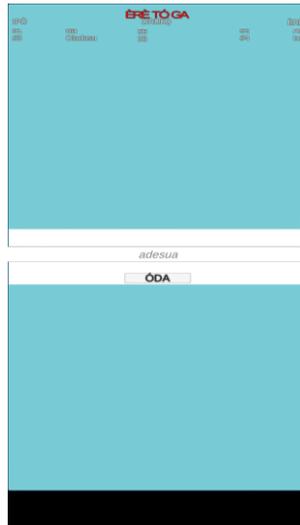


Fig.7. High Score Scene and User Interface for inputting Name

Table 2: User Evaluation results

	Extensibility	Ease of Use	Interest in Learning Yorùbá Language after Playing the Game
Excellent (5)	29	27	32
Good (4)	8	11	13
Neutral(3)	10	10	4
Poor (2)	1	2	1
Very Poor (1)	2	0	0

Based on the result of in Table 2, 70% of the users rated the extensibility of the system above average, 76% of them rated the ease of use above average and 90% of users' interest in learning Yorùbá language after playing are above average.

### 3.1 Software Reliability Test

The purpose for testing for the mobile game reliability is to check if the game can perform its function under certain condition for a period of time [18]. In order to perform this test metrics such as Mean Time to Failures (MTTF), Mean Time Between Failure (MTBF) and Mean Time to Repair (MTTR) were used.

Mean Time to Failure (MTTF) – This is referred to as the time interval between successive failures.

Mean Time to Repair (MTTR) – This is average time used to detect the errors causing the failure and time to fix the errors.

Mean Time Between Failures (MTBF) – It is the average time elapsed between a failure and the next time it occurs. This is the summation of MTTF and MTTR

It is important to note that the MMTR of a reliable should be decreasing while the MTBF should be increasing.

Table 2 shown below gives the details of the results of the software reliability test by playing the game on 5 different occasions for 3 – 5 hours to compute the reliability of the mobile game.

Table 2: Ssoftware Reliability Test results

	Execution Time(Hours)	MTTF(Hours)	MTTR(Hours)	MTBF(Hours)
1	4	2	0.47	2.47
2	5	2.6	0.32	3.32
3	4	3.2	0.25	3.45

	Execution Time(Hours)	MTTF(Hours)	MTTR(Hours)	MTBF(Hours)
4	4	4	0	4
5	3	3	0	3

#### 4 Conclusion

In conclusion, this research presents a mobile game model which provides a more efficient way of getting the attention of people to learn Yorùbá Language. The system was modelled based on gamification approach and implemented using C# programming language and other supporting tools as an android application, it works on devices running the Android operating system. The system was tested and evaluated by adopting TAM and questionnaires were administered to selected participants targeting group of people with little knowledge and interest in learning Yorùbá language and after playing the game more than average of the participants was interested in learning Yorùbá Language. The evaluation results revealed that the mobile game application provides a user friendly interface that allows users to express more interest in learning Yorùbá language. Future work will include the extension of the mobile game application to other mobile platforms such as iOS to reach a wider audience. It would also be interesting to add images of Yorùbá cultural dress to the game and also extend this framework to other indigenous languages.

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