ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

COLLEGE OF NATURAL SCIENCES

DEPARTMENT OF COMPUTER SCIENCES

Mobile-based Wolangna Language Learning Tool

BY

Dawed Nesru

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Signature of the Board of Examiners for Approval

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List of Acronyms

MWLLT	Mobile-based Wolangna Language Learning Tool
ADT	Android Development Tools
ALC	Accelerated Learning Center
ITS	Intelligent Tutoring System
JLPT	Japanese Language Proficiency Test
MBL	Mobile Based Learning
MLA	Mobile Learning Application
ML	Mobile Learning
PDAs	Personal Digital Assistants

Abstract

This project describes about design and implementation of a mobile-based Wolangna language learning system. The focus of the project is to teach learners alphabets, basic words and common conversations of wolangna language. Moreover, there are also exercises to figure out the users change in the language proficiency and storytelling to increase the learner's skill of listening.

For developing the application, we used Android SDK as it provides the tools and APIs necessary to begin developing applications on the Android platform using the Java programming language.

Additionally, the system has been evaluated with 15 users and the results of the survey shows that the users are happy with MWLLT system. This is inferred from the comments they have given in the questionnaire.

Key words: Mobile learning, Mobile language learning, Mobile learning application

Chapter One
Introduction

1.1. Background

Learning is a gain or a change in behaviour, skill, knowledge and values in a person's mind caused by a series of practice over a particular subject matter or a lifelong lesson which leads him/her to synthesize various types of information [2, 28]. As the learning technology has passed a number of evolutionary phases by incorporating the overshadowing learning theories and various teaching methods, learning has been comfortable using numerous types of technology. Beside this, many researches indicated that technology can support learning due to their possession of wealthy capability and performances integrated with them. However, in order to stick with the most efficient learning strategy which can build the conducive learning atmosphere compounded with rich learning material, adequate practice and rich facility that can meet with the goals of learners, learning should be integrated with the modern technology such as Electronic Learning (E-Learning) [31, 29]. E-Learning is a general term to express online, web based and technology aided (CD, tape recorder) learning. Furthermore, it is not narrowed to teaching and learning with the use of WWW rather it embraces teaching and learning which is aided by electronic materials like tape recorder, DVD player, Radio or any other electronic materials aimed for undertaking teaching –learning process. It may perhaps use the combination of text, images sound, video and other data formats.

E-Learning encourages learning out of class, with low cost and availing education anytime and anywhere. Moreover, E-Learning is advantageous for students and teachers in creating and cooperating in their organization, province and the entire world as a whole. Besides, Using E-Learning, you could have real time information, give training to students while you are away from the students and get guidance from experts without contact with him/her [37, 27, 11].

On the other hand, as a result of the rapid growth of mobile, ubiquitous and wireless technologies, it gave birth for the next development of E-Learning which is Mobile Learning (M-Learning). M-Learning refers to the use of mobile and handheld IT devices, such as Personal Digital Assistants (PDAs), mobile telephones, laptops and tablet PC technologies, in teaching and learning. It is peoples' preferences since it is undergoing rapid evolution, in a radical development with their performance improvements and opened up new showground for learners. Moreover, it is also beneficent for students and teachers to enable them collaborate and

communicate in the class room, out of class room and increase student and teacher participation in the teaching learning activities [1, 4, 14, 3, 11].

M-Learning is in many countries radar to conduct higher education, continuing education and individual learning in order to throw away the headache of time and space which is used to avail learning every time and everywhere [1].

Due to the rapid evolution in mobile and wireless technology that has been beneficent for education, language learning has been an area where mobile technology has been popular. M-Learning will form the new surrounding for foreign language learning as it helps people improve their language proficiency. Particularly, it is used to develop listening, speaking, reading and writing skill of various language learners. Meanwhile, it helps the learner build up his/her vocabulary step by step. Moreover, M-Learning will bring a new and advantageous platform for foreign language learning specifically in developing countries possessing multiple languages. It is particularly aimed for societies to improve their languages [1, 3].

1.2. Wolane Language

The Wolane tribe is one of Gurage tribes inhabiting approximately 160 km south of the Ethiopian capital city, Addis Ababa, at the north-eastern edge of the Gurage zone. They inhabit an area which is bordered by the River Gong in the north-east and by the River Kerib in the south; to the east and west no prominent landmarks exist [2].

The Wolane community consists of 160000 persons in total [5]. Although Wolane (also Walani, Wäläne, Welene, Olane) often appears in comparative works on South-Ethiosemitic and Gurage languages, it has hitherto been an insufficiently described language. Wolane and Silt’e are genetically very close to each other. Gutt tested the intelligibility between several Gurage varieties, with the result that Silt’e and Wolane are mutually intelligible [2]. Linguistically, Wolane is one language or language variety belonging to the East Gurage group; close linguistic relatives of Wolane are Silt'i and Azernet-Berbere. All three, Wolane, Silt'i and Azernet-Berbere have been classified as more or less different varieties of one Language [5].

1.3. Statement of the problem

Language has always been important in culture which helps people identify themselves. People can be identified about where they are through not only the culture but also through the language [30]. Language learning is an important task in its own right. This is mostly important in

developing countries where there is high ethno linguistic diversity [6]. Improving language learning resources has the potential to have a huge impact on improving social mobility and access to governmental and social services. Ethiopia is an example in this circumstance where there are more than 70 languages spoken in the country.

However, most of Wolangna speakers' children who are urban dwellers are not able to speak Wolangna as parents do not teach the language to their children so as to preserve the assets for the coming generations. This, in contrast, decreases the number of speakers which finally makes the language to be lost from the globe. Thus, so as to solve this problem, the children must be taught the language in order to preserve and transfer the language from generation to generation.

Moreover, the number of mobile subscribers in (Ethiopia) is expected to grow at 43% per year over the period, reaching almost 20 million by 2014 [7]. This is fruitful in teaching the language to mobile users as urban dwellers are nearest to mobile technology. Hence, mobile-based Wolangna language learning tool is very important to fill such gaps.

Thus, this project work focuses on the development of mobile-based Wolangna language learning tool so that the problems stated above are solved.

1.4. Objective

1.4.1. General Objective

The objective of the project is to design and develop mobile-based Wolangna language learning system.

1.4.2. Specific Objectives

The specific objectives include:

- Design a mobile-based Wolangna language learning system based on the identified requirements.
- Develop a prototype for the designed system
- Test the developed prototype.

1.5. Scope of the project

This system is designed to teach about the alphabets, some words and common conversations of the Wolangna language for English and Amharic speakers. Words will be taught through pictures and the corresponding English and Amharic word as there might be a person who might not know the appearance of the material to be learned. The system does not teach grammar and sentence construction.

1.6. Methods and tools of development

1.6.1. Data Collection Methods

Following are the data collection methods to be used for requirement elicitation.

- Interview- was conducted with Wolangna language speakers and Linguists.
- Litrature review was made to get more idea about the project.

1.6.2. Android Development Tools (ADT)

Android Development Tools (ADT) is a plug-in for the Eclipse IDE that is designed to build Android applications.

1.6.3. Eclipse Helios IDE

Eclipse version Helios is used as integrated development environment.

1.7. Application of the project

The tool can be used by any person who speaks English or Amharic to learn Wolangna. The work might initiate linguists/researchers for further research on the language.

1.8. Organization of the paper

This paper has Six Chapters including the current One. The Second Chapter is about the literature review and related works. The Third Chapter is system analysis. Use cases, sequence and other diagrams are included in this chapter. The Fourth Chapter contains about system design. Here subsystem decomposition and hardware/software mapping are included. The Fifth Chapter is implementation. The Sixth and last Chapter is about conclusion and future work.

Chapter Two
Literature Review and Related Works

2.1. Literature Review

2.1.1. Mobile-Phone Technology

2.1.1.1. Mobile phone

Mobile phone is initially made to make and receive call using radio wave by sending signals on the wave. However, currently mobile phones provide different services like SMS, EMAL, GPS, Bluetooth and other services. Dr Martin cooper of Motorolla is the first person to demonstrate the first hand held phone in 1973. Moreover, Dyna TAC 8000x is the first commercially available phone [8].

As a result of attractive means of communication and applications of mobile-based communication, in the twenty years from 1990 to 2011, mobile phone users increased from 12.4 million to over 5.6 billion. [9].

2.1.1.2. Mobile operating system

Mobile operating system is a system which operates or controls the hardware like smart phone, tablet, PDA or any ordinary mobile phones. Latest mobile operating systems have PC operating system functionalities and additional features like touch screen, Bluetooth, WIFI and other services. The list of 9 popular mobile operating systems from the latest are as follows: Android OS (Google Inc.), Bada (Samsung Electronics), BlackBerry OS (Research In Motion), iPhone OS / iOS (Apple), MeeGo OS (Nokia and Intel), Palm OS (Garnet OS), Symbian OS (Nokia), webOS (Palm/HP), Windows Mobile (Windows Phone 7) [10].

2.1.2. Mobile-based Language Learning

Mobile based language learning is a way in which mobile devices are used to carry out teaching learning process. It enables learners to learn in anytime and anywhere manner. Due to accessibility of mobile devices by individuals, rapid evolution of wireless and mobile technology, the use of mobile learning became real. Primarily, language learning using mobile phone was restricted to getting the meaning of a word or pronouncing a word. However, the current multimedia facility of mobile phones made language learning using mobile phone comfortable for teaching languages intelligently along with consideration of personalization and contextualization of resources to learners. Moreover, research based learning methods are twisted to integrate with mobile phone learning to fulfill the need of convincing language learning contents to students. Because, the mobile phones have the capacity and performance of

providing and storing video and audio contents which improve the listening and speaking skill of language learners [3,12,13,14, 1].

2.1.2.1. Architecture of M-Learning

Although many researchers use various terminologies to explain the parts of M-Learning architecture, it generally has three layers. These are presentation layer, logical layer and data layer. Presentation layer is an interface which is located in the client side. It is an interactive part which is used as a bridge between the system and the learner. Moreover, it is responsible for sending requests forwarded by the learner to the logical layer. Logical layer is the nucleus of the whole system, which receives requests coming from presentation layer, processes the request, estimates the result logically, fetches the logical estimation from the data layer and responds back to the presentation layer. Data layer is responsible for distributing data to applications commanded by the logical layer due to its logical estimation of the requests forwarded by the presentation layer [32, 33, 34].

2.1.2.2. Features of M-Learning

According to [1, 3, 34, 35], the following are features of Mobile based learning: Mobility, Real Time, Interactive, Virtualization, Digitization, Individualization, Context sensitivity and Personalization.

Mobility: learning is movable and ubiquitous in mobile technology as long as the equipment is with leaner. There is no time and space restriction in mobile based learning. Hence, in mobile based learning, learners should not be embedded in class rooms and schedules can be rescheduled as per the need of the leaner.

Real Time: mobile based learning has the ability to answer questions automatically and browse questions to test the learner's change and also provide the possible answers to learners. Hence, mobile based learning works in real time manner.

Interactive: it is one of the mobile based learning features in which different peripheral devices are used by instructors and students communicate. In this manner, the system is used as a bridge to create the interactive communication between instructors and the system so that further discussion takes place between them.

Virtualization: mobile based learning creates a virtual class room consisting of student and virtual instructor. The learner can ask the instructor (system). The students also can respond to the virtual instructor.

Digitization: all resources in the M-Learning is digital such as the multimedia resources and network communications are working digitally.

Individualization: mobile based learning serves individuals according to their need. Learners can learn selectively as per their need.

Personalization: it is the recent feature of mobile based learning which personalizes resources based on the context data collected about the learner. The system recommends as per the skill of the learner deduced by the system inferred from the results of the exercises presented to learner.

Context sensitivity: mobile based learning collect context environmental and personal data of learner, which is used by the system for further processing like personalization.

2.1.2.3. Constraints of Mobile based language learning

Although mobile based learning benefited to the globe as a whole, it is impaired with some challenges that are in investigations by researchers. Some of the challenges as stated in [36, 12] are the following: Poor sound, Display quality, Power constraint and small screen size.

Poor sound: listening is one of the language skills that the speaker ought to have. However, some systems have inadequate sound quality to teach the listening skill of language learners.

Display quality: the quality of images and videos matters a lot in propagating the learning process to learners. The better the display quality, the better the language learning takes place. However, lack of display quality is one of the challenges faced in mobile based learning.

Power constraint: mobility of learning, in contrast to its benefit, it does power usage problem. As mobile learning can take place anywhere and anytime, technologies should be evolved which uses low power and works for long time.

Small screen size: since there are many multimedia resources that must be displayed to the learner, the screen size matters a lot in transferring the information to the learner.

2.1. Related Works

There are various learning applications developed for different purposes. However, some of some are specific some users and some are general. Each of the tools is considered to be relevant for different users based on their needs. Moreover, there are a few mobile based language learning systems developed to teach different languages based their need. We discussed some of them in the following subsections.

2.1.1. Personalised Language Learning on Mobile Device (PALLAS)

PALLAS is a mobile based language learning system developed by Sobah Abbas Peterson and Jan-kristian Markiawicz in Trodein, Norway. It is developed as a prototype to testify personalization and contextualization of resources to learner are significant to a mobile-based language learner. In this context, personalization means availing learning resources and services based on the learners' context information. In other word, making learning as a learner oriented instead of making it general. The parameters used by the system for personalization of resources are environmental variables and personal information of the learner. Environmental variables include location, time, device of learner used to run the system and learner's personal information include age, first language and academic background. Using the parameters listed above, the system can personalize resources to the learner [3].

Microsoft Windows technology and the .NET development platform are used as a tool to develop the system. The PALLAS uses Qtek 8310 Smartphone which runs Windows Mobile 5.0 OS as a platform [3].

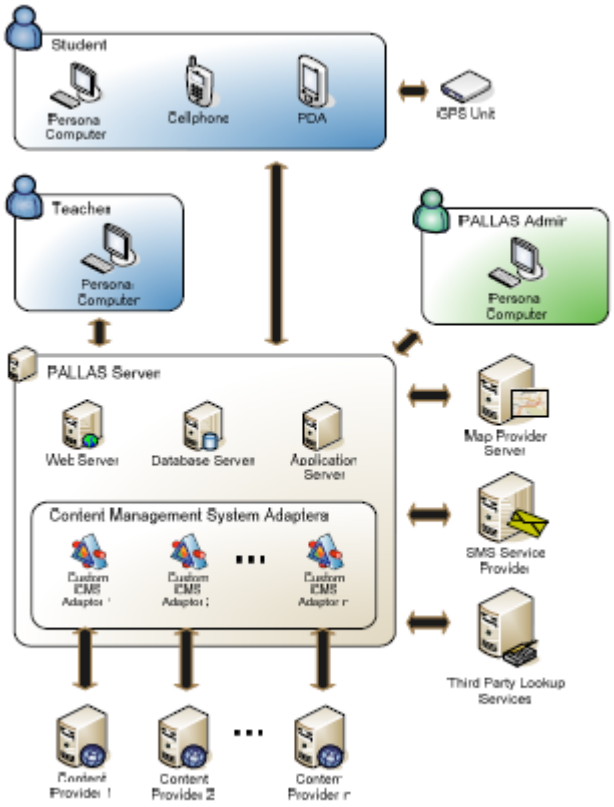

Figure 2.1 PALLAS system overview [3]

As you can see in figure 2.1, PALLAS has a central server which is used as a hub for storage and distribution of contents. This server is composed of three components: web server, database server and application server. The web server used to serve webpage files and provide web

services to the user. Database server is used to store data like learners' personal information which is used by the system to personalize resources to the learner. Application server fetches contents from the content management system of the houses [3].

Moreover, PALLAS facilitates its functionality by using three components. These components work with the system to provide a better service for the learners. The first component is Map provider which is used by PALLAS to get location context information of the learners, which is highly important in providing resource to the learner based on the their condition (Personalization) as it should not be the same the content accessed by the learner when he is in home and when he is at work. The second component is SMS provider. SMS service is the other functionality of PALLAS gained from this component. This service is used to response to learner when the learner wants to initialize the system using SMS request as the system can be initialized using SMS request. The last component used by PALLAS is third party look up. Sometimes, there might be inadequate information in the server to provide services to the learner. At this time, the server uses another source to get the contents requested by the user. This is performed by using a third party look up, such as Google search [3].

PALLAS offers its service to three types of users, such as students, teachers and system administrators using different ways. Teachers have access privilege towards the contents and are responsible for managing students learning activity. On the other hand, system administrator has the power of configuring access privilege to teachers and students to use PALLAS. Moreover, users can access the system using desktop PC or mobile phone to use the PALLAS system. However, there are different ways of accessing PALLAS system. The first way of accessing the system is by using a mobile phone browser which is used to fetch the website of the PALLAS after logging into the system. The second way of accessing PALLAS system is by using custom client application which is specifically developed for PALLAS. The third, and the last way is similar with the first way. However, in this case, desktop PC is used instead of mobile phone [3].

2.1.2. Personalized mobile English vocabulary learning system

A personalized mobile English vocabulary learning system is language learning system developed by Chih-Ming Chen and Ching-Ju Chung in Graduate Institute of Library, Information and Archival Studies, National Chengchi University, Taiwan which is developed using Microsoft Visual Basic .NET 2003 thereby enabling the it to run on over two hundred kinds of web mobile devices like mobile phone and PDA. It is developed for the purpose of shaping the English vocabulary learning facility of individuals based on their vocabulary abilities

and learning memory cycles. In this system, learners' vocabulary abilities are measured using Item Response Theory (IRT) which is broadly working theory in order to assess learning of individuals. Specifically, it is popular in computerized adaptive testing [15].

The personalized mobile based English vocabulary learning system is composed of three layers: remote management server, the client mobile learning system and the data synchronized agent [15].

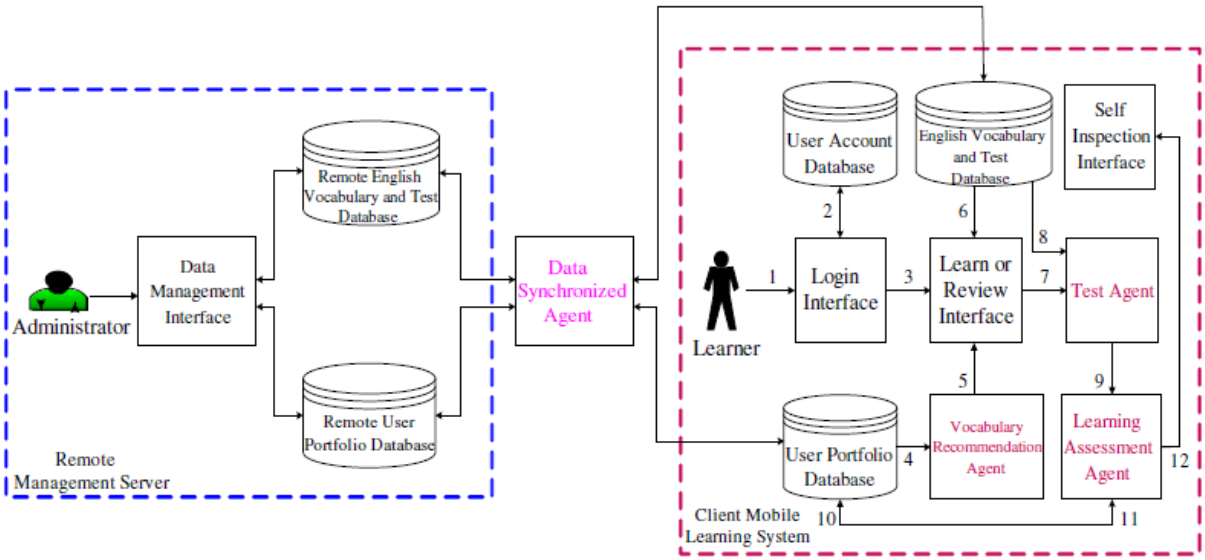

Figure 2.2 system architecture of personalized mobile English vocabulary learning system [15]

Figure 2.2 shows the architecture of personalized mobile English vocabulary learning system. The left part of the figure shows the remote management server which is composed of two databases and a data management interface: remote vocabulary and test database, and remote portfolio database. The remote vocabulary and test database is designed so that it stores vocabulary materials and list of tests which is used to verify users' vocabulary abilities after learning is took place. The other component in the remote management server which is remote portfolio database is responsible for storing the results of learners' inferred from the tests given to learners. In the server there is also data management interface which is accessed by administrator (instructor) to modify, add or delete vocabulary materials from the remote vocabulary and test database [15].

The right part of figure 2.2 shows the architecture of client mobile learning system which is the main application which runs on individual mobile phone. As you can see in the figure, the client system has three different databases from which two of them are similar with two databases located in the remote management server whereas the other one which is the user account

database is the different in its information type stored in it. The first database is the vocabulary and test database which is similar, in its function, with remote vocabulary and test database which is located in the remote management server. The second database is the portfolio database which is gain similar, in its functionality, with that of the remote portfolio database. The last database in the client application is the user account database which is used to verify users' authentication in to the system. In the client system in addition to the databases, there are three interfaces used each by different users. The first interface is log in interface which is used by individual learner so as to use the client application. Users are checked if they have the privilege to use the system against the user account database located in the client application. The second interface is the main interface of the client application which is used by learners to learn new words or review learned words. This choice is based on the learners' desire to learn new one or to review the learned words. All the testing, learning or reviewing is took place in this interface. The third, the last interface in the client application is the self inspection interface which is used to check the learners' status [15].

Client mobile learning system also has three intelligent agents which facilitates its functionality of teaching vocabulary. These are: test agent, vocabulary recommendation agent and learning assessments agent. The test agent is accountable for preparing tests for the learner after learning took place. The test agent prepares tests by using the data stored in the vocabulary and test database. Then, after the test is presented to the learner, the learning assessment agent is responsible for assessing the learners' change by observing the test results of the learner so that the system can identify the vocabulary abilities of the learner. The result of the test is stored in the user portfolio database so that the system uses these data for recommending words to the user. Finally, the results stored in the user portfolio database are inferred by the vocabulary recommendation agent to recommend words to the learner based on the learners' vocabulary abilities [15].

As you we have discussed before, the remote management server and the client mobile learning system has databases for each of them. However, the information stored in these databases has to keep their consistency. For example, remote user portfolio database which is placed in the remote management server and the user portfolio database in the client mobile learning system store the same user portfolio data which must be synchronized. This synchronization part is undertaken by the third component of the personalized mobile English vocabulary learning system which is called data synchronized agent. This agent enables the system to be used in an

offline manner when there is no connection. Then, when the connection is established, the databases will be synchronized so that similar databases can have the same database information [15].

2.1.3. Investigating an intelligent mobile phone-based vocabulary tutor

The VocabTutor system was developed by Glenn Stockwell in Waseda University, Tokyo, Japan for the purpose of investigating the system by learners in an advanced EFL (English as a Foreign Language) class. The system is implemented using PHP and MySQL and is accessed through a mobile phone and desktop PC. As it is integrated with Moodle (Course managements system), it is possible to access the system through Moodle. However, the login details in PC and mobile phone are the same. The database as well is synchronized between mobile phone detail and PC detail for the sake of preserving data consistency [16].

One of the pleasant features of VocabTutor system is the separation of contents and source codes. In other words, the contents of the system are not hard coded which eases maintenance. Hence, to add extra vocabulary, there is no need of affecting the interface and also when you want to change the interface there is no need of affecting the contents of the system. Moreover, VocabTutor system works in turn manner, which means one cannot proceed to the subsequent lesson unless he/she finishes the previous lesson given by the system [16].

2.1.4. Mobile-based Amharic language learning tool

This tool is developed by Axumite Tassew in Addis Ababa University, Addis Ababa, Ethiopia as a partial fulfillment of the M.Sc. program in Computer science Department. It is implemented using Eclipse integrated development environment for editor, Android SDK for compiling, and running java codes and the Android development tool as a plug in to the Eclipse IDE to run java codes which can run on only Android operating systems. The entire content is located in the mobile phone [17].

Mobile based Amharic language learning tool is developed to teach Amharic language to visitors coming to Ethiopia or any other person who wants to learn Amharic language. However, the learner should speak English. Moreover, the system is limited to teaching the Geez alphabets, the common words of Amharic language and some common Amharic conversations. Besides, it includes the three language skills i.e. listening, reading and writing [17].

From the aforementioned works, we have realized that mobile technologies can be used to teach different language. However, to the best of my knowledge, there is no tool which teaches Wolangna language in any technology whether in mobile-based, computer-based, web-based or in any other format, that is officially known. Thus, the project is aimed to develop a mobile based Wolangna language learning tool by overcoming the drawbacks listed above with respect to each of the system.

Chapter Three
System Analysis

In this chapter, we will describe features of the proposed system, functional and non-functional requirements of the system.

3.1. Current System

To the best of my knowledge, there is no Mobile-based Wolangna language learning system implemented in any system. Thus there is no as such current system available on which the new system will be based on.

3.2. Proposed system

The MWLLT system is the software that is expected to teach Wolangna to English and Amharic speakers on PDA environment. This system should allow the user to learn Geez alphabets, Wolangna words, conversations and other lessons to the user. This is for the sake of teaching Wolangna to interested users who can speak English or Amharic.

3.3. Functional Requirements

The proposed system is expected to provide the following functionalities:

- The system allows the user to learn Ethiopic letters accompanied with their corresponding sounds and transliterated letters.
- The system allows the user to learn common Wolangna words with pictures and pronunciations.
- The system allows the user to learn common Wolangna conversations with their pronunciation and English translations.
- The system allows the user to learn days, months and numbers.
- The system allows the user to learn some commonly used Wolangna expressions.
- The system allows the user to listen simple story for the improvement of the learners' ability.
- The system gives information about the Wolangna language speakers.
- The system allows to do some exercise to cross-check the learners' improvement.

3.4. System Models

This subsection presents three models; use case diagram, class diagram and sequence diagram.

3.4.1. Use Case Diagram

A use case describes a function provided by the system that yields a visible result for an actor. Use cases are used during requirements elicitation and analysis to represent the functionality of the system. Use cases focus on the behavior of the system from an external point of view. A use case describes a function provided by the system that yields a visible result for an actor. An actor describes any entity that interacts with the system (e.g., a user, another system, the system's physical environment). The identification of actors and use cases results in the definition of the

boundary of the system, which is, in differentiating the tasks accomplished by the system and the tasks accomplished by its environment. The actors are outside the boundary of the system, whereas the use cases are inside the boundary of the system [18].

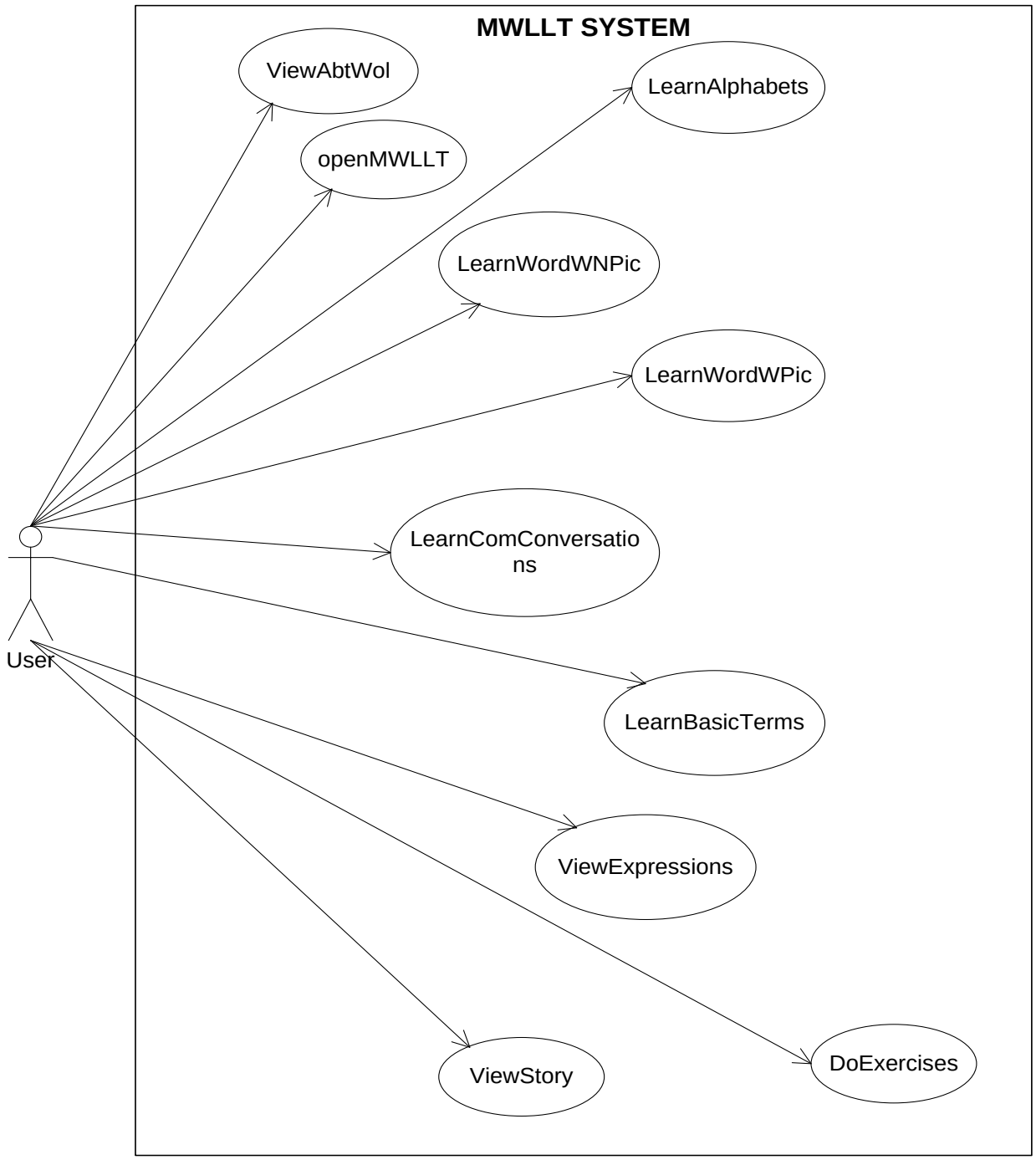

Figure 3.1 Use Case Diagram for Wolangna language learning tool

Figure 3.1 shows the use case diagram of the MWLLT system. The diagram has an actor and 10 use cases. All the use cases are described in the next section.

3.4.2. Use Case Description

Name: OpenMWLLT(Mobile-based wolangna language learning tool)

Description: Allows the user to open the MWLLT system.

Flow of Events:

1. The user wants to open the MWLLT system
2. The user clicks on the “Menu” button of the cell phone.
3. The phone system displays a collection of applications including the MWLLT system.
4. The user clicks on the MWLLT application
5. The MWLLT application is opened.
6. Use case ends

Name: ViewAbtWol

Description: Allows the user to Read about Wolane people.

Flow of Events:

1. The user wants to view about the Wolangna Language speakers.
2. The user clicks on the “People” link from the list.
3. The system displays a page which describes about the Wolangna language speakers.
4. Use case ends

Name: LearnAlphabets

Description: Allows the user to Learn Ethiopic Letters.

Flow of Events:

1. The user wants to learn Ethiopic letters.
2. The user clicks on the “Alphabets” link from the list.
3. The system displays **“ሀ to ሆ”** with white background color and **“ሀ to ፐ”** without white background color.
4. The user clicks on the alphabets with white background color.
5. The system displays the transliterated alphabets with Latin text and the pronunciation of the alphabets clicked by the user.

6. Use case ends

Name: LearnWordWPic

Description: Allows the user to Learn Wolangna Words with the corresponding pictures.

Flow of Events:

1. The user wants to learn Wolangna Words with pictures.
2. The user clicks on the “Words” link from the list.
3. The system displays the list of word category.
4. The user clicks on a “Word with picture” link from the list.
5. The system displays list of Wolangna Words.
6. The user clicks on the Words with picture link from the list.
7. The system displays words with their corresponding pictures.
8. The user clicks on the Wolangna text from the page.
9. The system pronounces and transliterates the word clicked by the user.
10. Use case ends.

Name: LearnWordWNPic

Description: Allows the user to Learn Wolangna Words with the corresponding pictures.

Flow of Events:

1. The user wants to learn Wolangna Words with pictures.
2. The user clicks on the “Words” link from the list.
3. The system displays the list of word category.
4. The user clicks on a “Word without picture” link from the list.
5. The system displays list of Wolangna Words.
6. The user clicks on the Words without picture link from the list.
7. The system displays words with their corresponding meanings and links to examples.
8. The user clicks on the Wolangna text from the page.
9. The system pronounces and transliterates the word clicked by the user.
10. Use case ends.

Name: LearnBasicTerms

Description: Allows the user to Learn basic terms of Wolangna.

Flow of Events:

1. The user wants to learn Wolangna basic terms.
2. The user clicks on the “Basic Terms” link from the list.
3. The system displays the list of Basic terms category.
4. The user clicks on his choice from the list.
5. The system displays basic terms.
6. The user clicks on the Wolangna text from the page.
7. The system pronounces and transliterates the word clicked by the user.
8. Use case ends.

Name: LearnCommonConversation

Description: Allows the user to Learn Common Wolangna conversations.

Flow of Events:

1. The user wants to learn how to make conversation.
2. The user clicks on the “Conversation” link from the list.
3. The system displays the list of Conversations.
4. The user clicks on his choice from the list based on his/her interest.
5. The system displays the page requested by the user with texts and instructions how to start the Conversation.
6. The user clicks on the “full” button to start the Conversation fully.
7. The system displays the conversation text turn by turn with their corresponding pronunciations.
8. Use case ends.

Name: ViewStory

Description: Allows the user to Learn Wolangna language using simple stories.

Flow of Events:

1. The user wants to Learn Wolangna language using simple stories.
2. The user clicks on the “Story” link from the list.
3. The page displays list of stories.
4. The user selects from the list.
5. The system displays the page requested by the user to start the Story.
6. The user selects the lettering and clicks on the “Start” button to start the Story.
7. The system starts the story telling text turn by turn with their corresponding audio sound.
8. Use case ends.

Name: viewExpressions

Description: Allows the user to read about common expressions used in Wolangna language.

Flow of Events:

1. The user wants to read about Expressions.
2. The user clicks on the “Expressions” link from the list.
3. The system displays list of Wolangna language expressions.
4. Use case ends

Name: doExercise

Description: Allows the user to Learn Wolangna language using simple stories.

Flow of Events:

1. The user wants to do exercises.
2. The user clicks on the “Exercise” link from the list.
3. The page displays list of exercises.
4. The user selects from the list.
5. The system prompts the user to enter username.
6. The user fills his user name and clicks on “Ok” button.
7. The system displays the page requested by the user to start the Exercise.
8. The user selects the lettering and clicks on the “Start” button to start the Story.

9. The system starts the exercise along with his record if he/she has previous results.
10. Use case ends.

3.4.3. Object Model

In this section, we will present the detail description class prior to the class diagram so as to have a clear understanding about the classes.

Table 3.1: boundary, control and Entity classes

Boundary class	Control class	Entity class
Abt_Page	Abt_Control	Alphabet
Alphabet_Page	Alphabet_Control	WordWPic
WordWPic_Page	WordWPic_Control	WordWNPic
WordWNPic_Page	WordWNPic_Control	BasicTerm
BasicTerm_Page	BasicTerm_Control	Conversation
Conversation_Page	Conversation_Control	Story
Story_Page	Story_Control	Exercise
Expression_Page	Expression_Control	
Exercise_Page	Exercise_Control	

Table 3.1 shows the list of classes participated in the system. The types of classes participated in the system are boundary class, control class and entity classes. All of the classes are briefly described in the following section.

3.4.4. Data dictionary

The system has different types of boundary, control and entity classes. The table below shows the detail descriptions of the classes to make the class diagram easy to understand.

Table 3.2 Description of Entity class

Class	Description
Alphabet	These are alphabets that are going to be learned in the system. They are identified in the system by their own attributes like alphabetName, alphabetSound and alphabetTrans, which is the transliterated text of the alphabet. They have methods like setContentView() to display the interface of the alphabet, getText() to get the alphabet displayed to use it for further operations, setText() to display text on the textview, playAlphabet () to play the pronunciation of the alphabet, changeAlphabet() to change the family of alphabet displayed and displayAlphabetTrans()

	to display the transliterated text of the alphabet.
WordWPic	A class which represents words with pictures. They do have attributes like wordName, wordSound, wordImage, wordTrans which is the transliterated text of the word, wordAmMeaning and wordAmMeaning which are the Amharic and English meaning of the word respectively. They have the following methods: setContentView(), getText(), setText(), changeWord() which is used to change the word displayed, playWord(), displayTransWord() and setBitmapImage() to display the image on the layout.
WordWNPic	A class which represents words without pictures rather with examples. They do have attributes like wordName, wordSound, example, wordTrans, Amharic and English meaning of the word. They have the following methods: setContentView(), getText(), setText(), changeword() , playWord(),displayTransWord() and displayExample() to display the examples corresponding to each of the words.
BasicTerm	A class which represents Wolangna basic terms like days, months, numbers and family. It has the following attributes: wordName, wordSound, example, wordTrans, Amharic and English meaning of the term. They also have the following methods: setContentView(), getText(), setText(), playWord(),displayTransWord(), changeTerm() to change the terms displayed.
Conversation	It is a class for representation of the conversation. It is identified by the following attributes: dialogue, dialogSound, dialogTrans, Amharic and English meaning of the conversation. It also do have the following methods: setContentView(), getText(), setText(), playSound(), displayTrans(), continue() to display the rest of the dialogue after the first display and fullplay() which is used to display the dialogue one by one accompanied with their meanings and pronunciations.
Story	A class to represent the story and identified by attributes like StoryName, sentence, storySound, url, transliterated text, Amharic and English meaning of the story. It also do have the following methods: setContentView(), playStory(), displayVoc() to display the English and Amharic meaning of the Vocabulary included in the story, displayMeaning() to display the meaning of the whole story.
Exercise	It is an exercise class identified by the attributes like type (multiple choice or matching), ExName(is it related with words or conversation), username to start the exercise, audio and ExImage. The following are methods included in this class: setContentView(), getText(), setText(), playAudio(), displayTrans() and setBitmapImage(), changeQuestionNum() to change the question number, checkAns() is used to check whether the answer is wrong or write and record Result() which is used to record the results of the user.

Table 3.2 shows the description of all entity class diagram participated in the system. They are described by their attributes and method which are in the class.

Table 3.3 Description of Control classes

Class	Description
Abt_Control	A class which is responsible for the posting information about the Wolane people.
Alphabet_Control	A class which controls all functionalities related with learning alphabets.
WordWPic_Control	A class which is responsible for facilitating learning words with pictures.
WordWNPic_Control	A class which handles displaying text, playing audio files and other tasks related with learning words with examples.
BasicTerm_Control	A class which handles tasks related with learning basic term.
Conversation_Control	A class responsible for generating different file types initiated by the user.
Expression_Control	A class which is responsible for displaying Wolangna expressions.
Story_Control	A class for generating stories selected by the user.
Exercise_Control	A class responsible for generating different type of exercise. It handles all the business rules related with exercise.

Table 3.3 shows description of control classes which are included in the system. Their functions are also described here.

Table 3.4 Description of Boundary classes

Class	Description
Abt_Page	A page which provides the capability to read about Wolane people.
Alphabet_ Page	It is a page which is used to lean alphabets by pressing the alphabets.
WordWPic_ Page	It is a page used to learn words accompanied by pictures.
WordWNPic_ Page	A page which provides a capability for learning words without pictures but accompanied by examples.
BasicTerm_ Page	A page which provides the facility to for learning basic terms like days, family, months and numbers.
Conversation_Page	A page responsible for facilitating learning of common Wolangna conversations.
Expression_ Page	A page which provides the capability to read Wolangna expressions.
Story_ Page	A page which provides the facility to read and listen simple stories.

Exercise_ Page	A page which provides the capability to do exercise.

Table 3.4 contains the description of boundary classes along with their functions in the system.

3.4.5. Class diagram

The class diagram shows the classes in the system and their relationship. Figure 3.2 shows the class diagram for the MWLLT. This class diagram is based on the description in table 3.2 which is the Entity diagram. All the entity diagrams are included in the class diagram. So, each of the attribute and methods are explained in the entity class which is described in table 3.2.

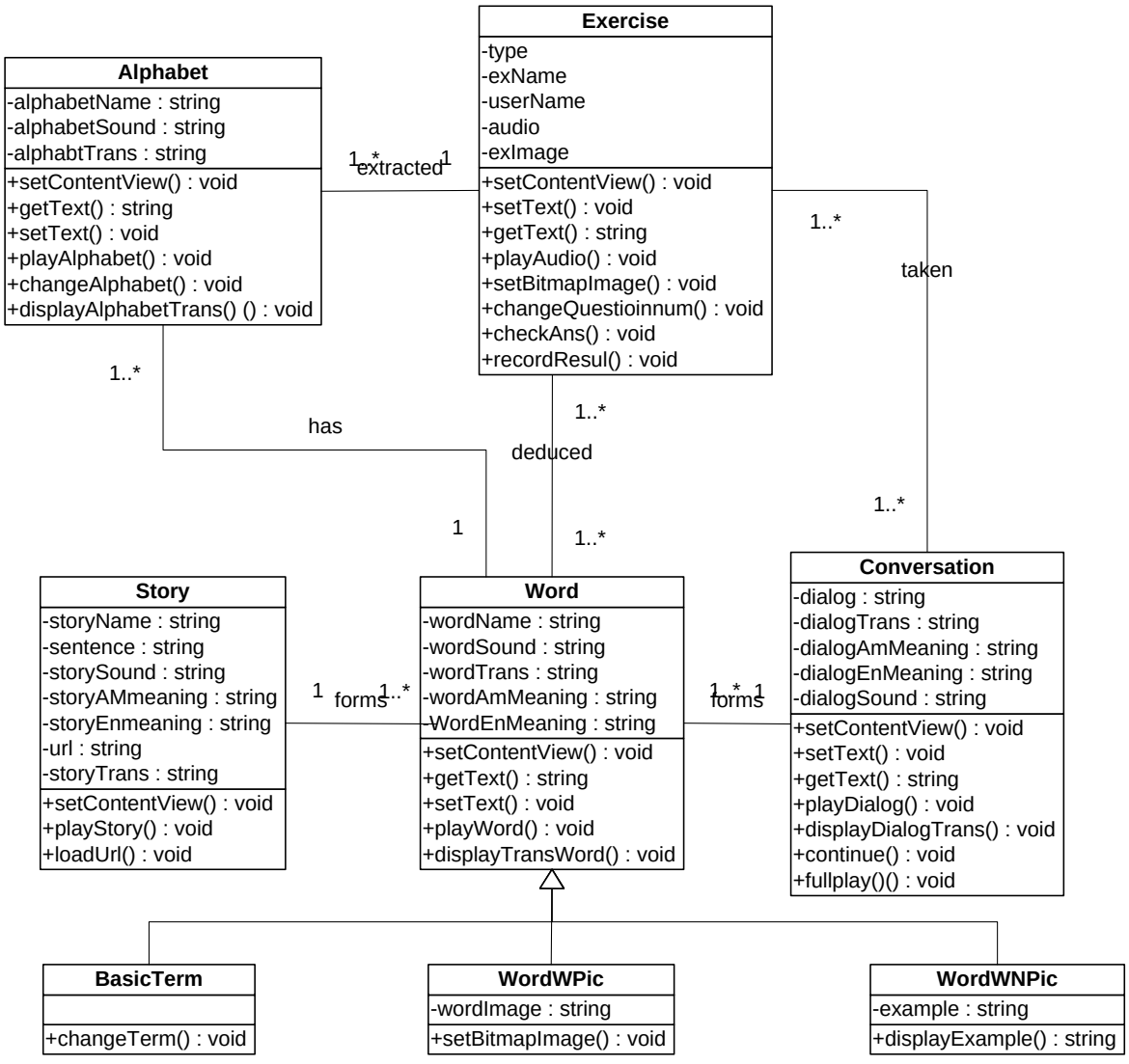

Figure 3.2 Class Diagram

3.4.6. Sequence Diagram

Sequence diagrams are used to formalize the behavior of the system and to visualize the communication among objects. They are useful for identifying additional objects that participate in the use cases [18]. Figure 3.3-3.11 shows sequence diagrams. All the sequence diagrams are described including how they flow in the use case description which is section 3.4.2.

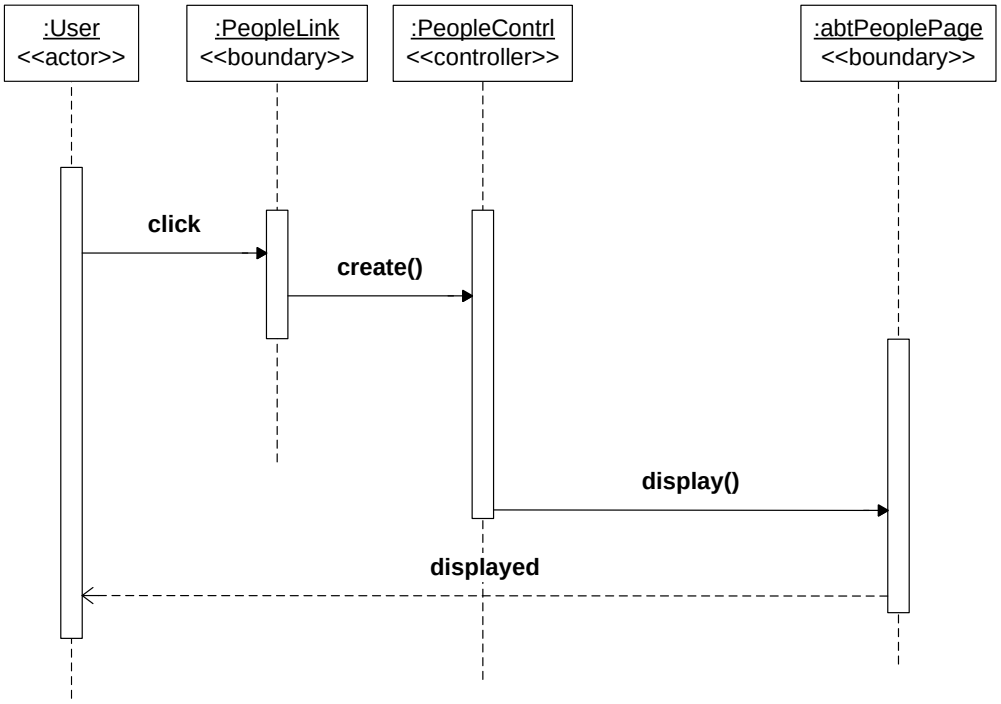

Figure 3.3 Sequence diagram for the use case ViewAbtWol

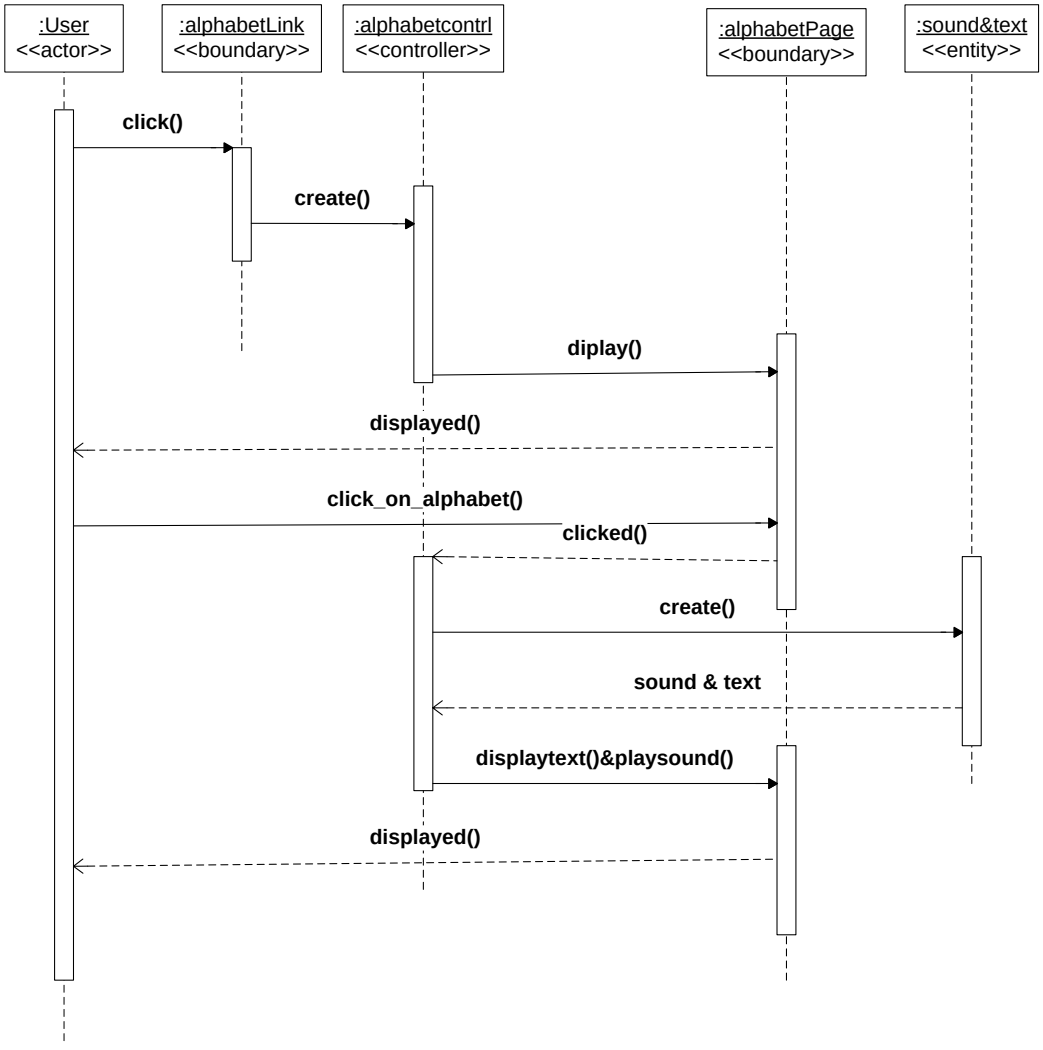

Figure 3.4 Sequence diagram for the use case LearnAlphabets

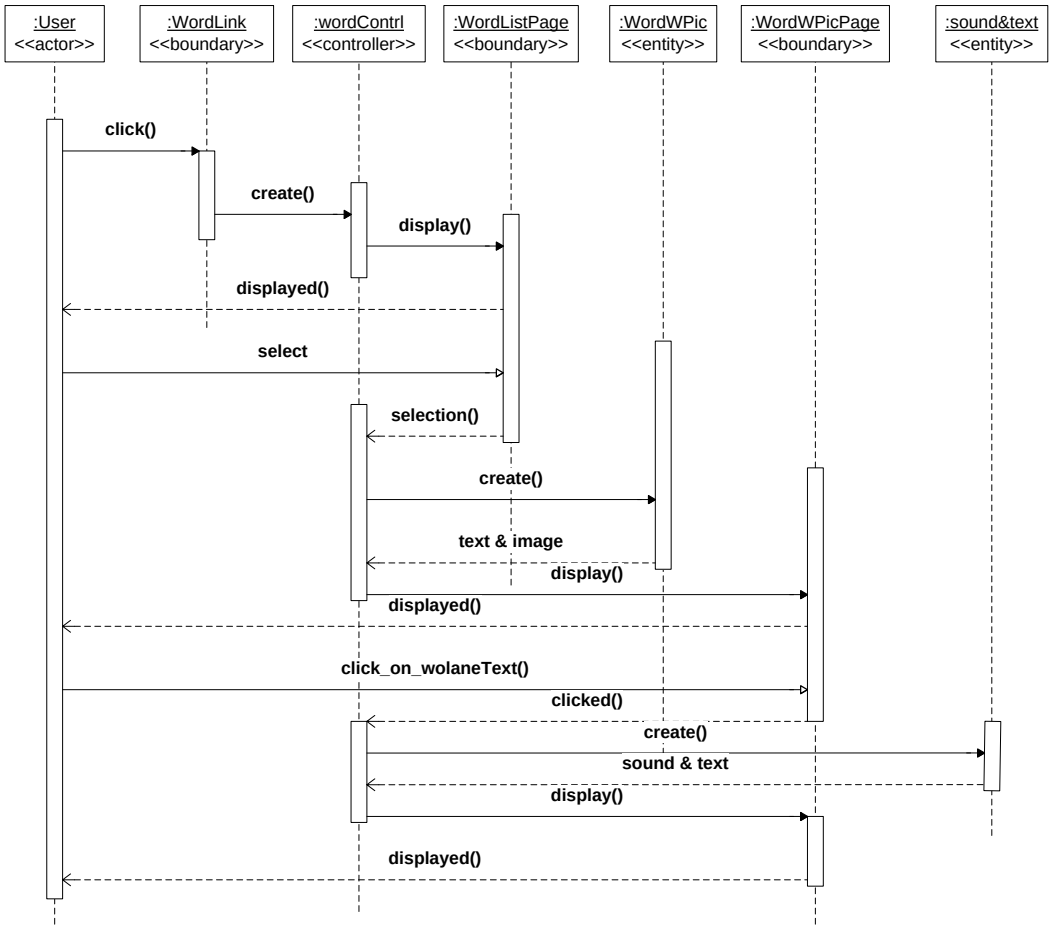

Figure 3.5 Sequence diagram for the use case LearnWordWPic

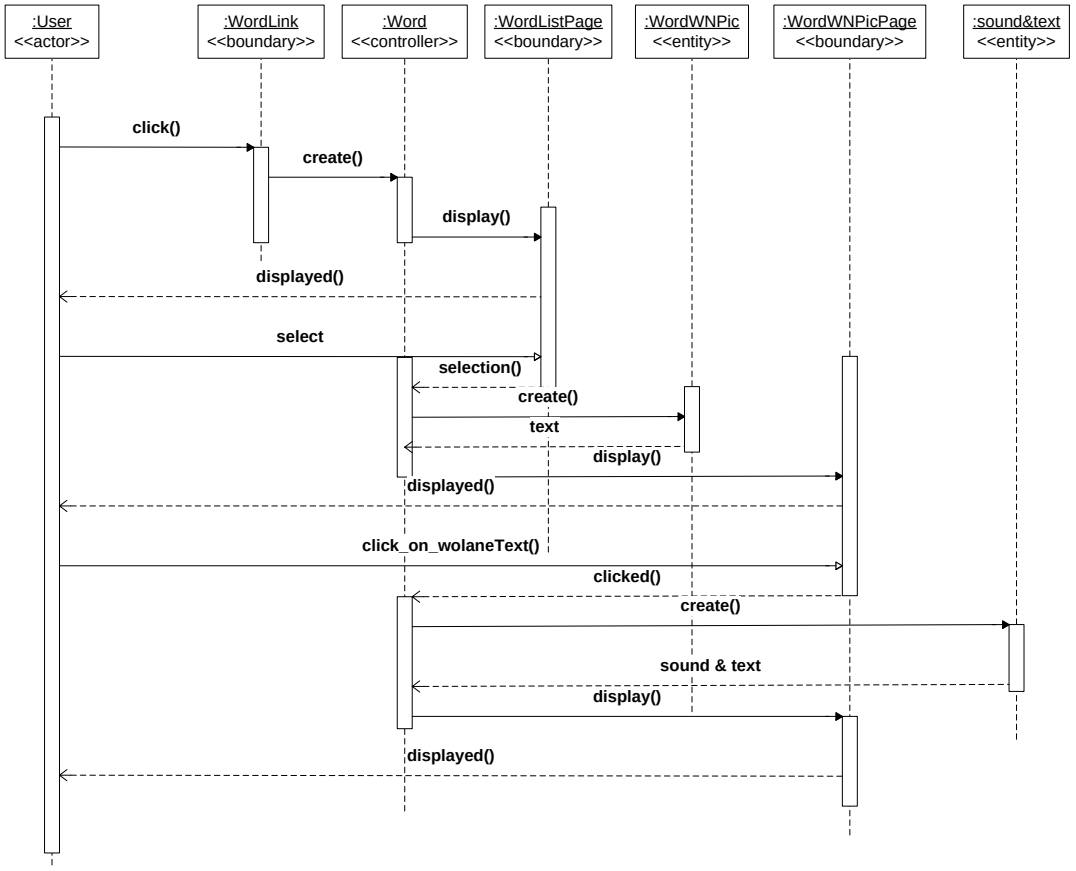

Figure 3.6 Sequence diagram for the use case LearnWordWNPic

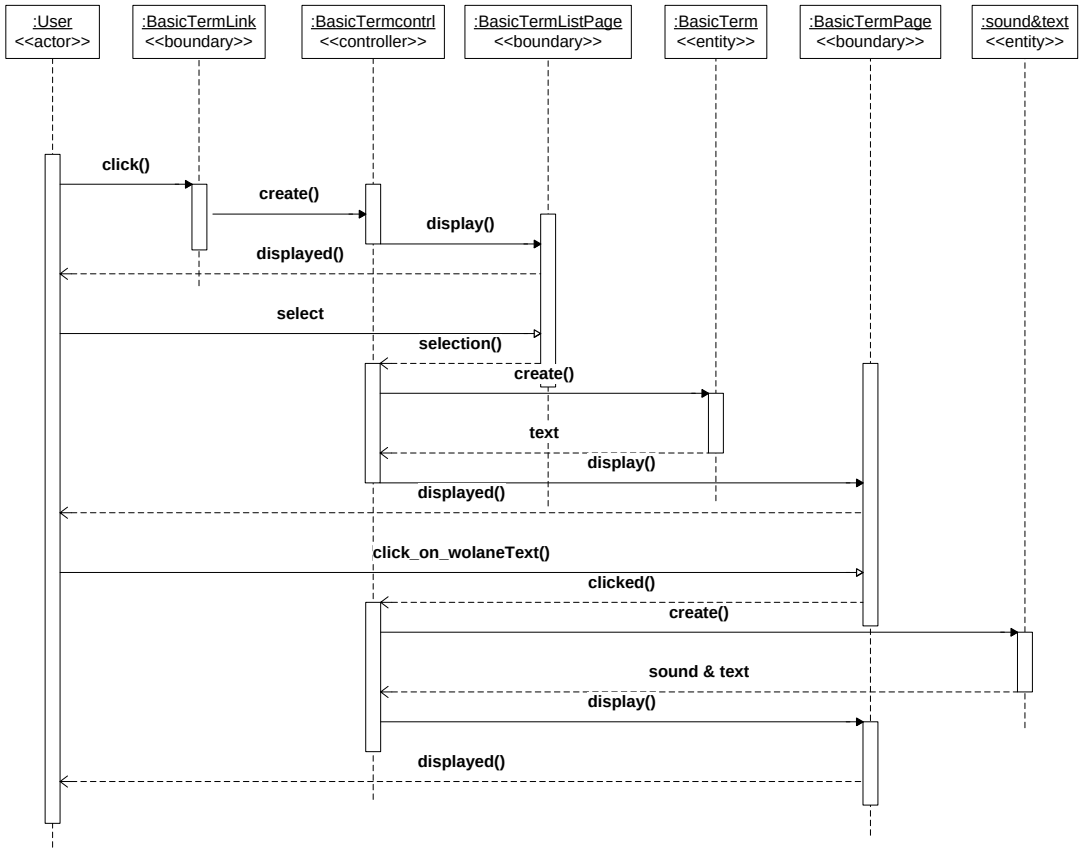

Figure 3.7 Sequence diagram for the use case LearnBasicTerms

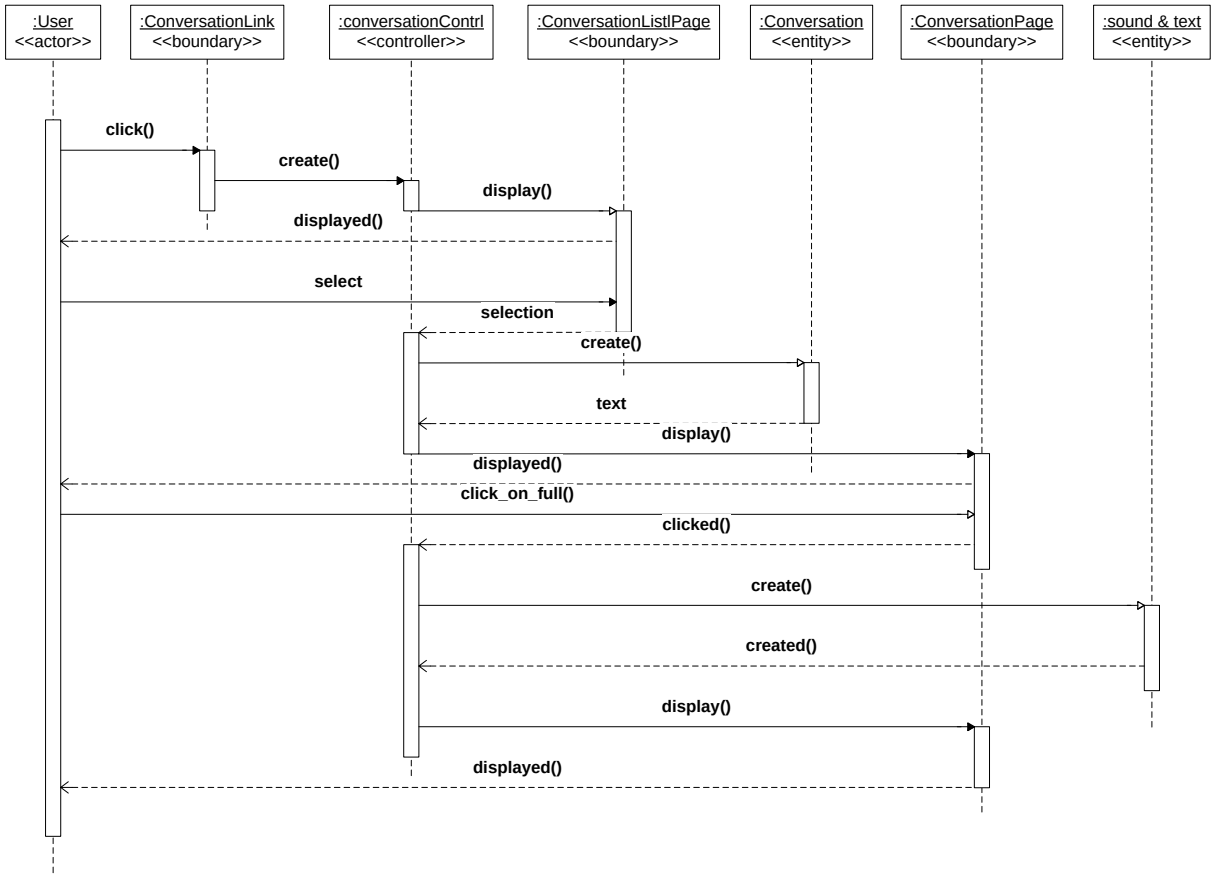

Figure 3.8 Sequence diagram for the use case LearnComConversation

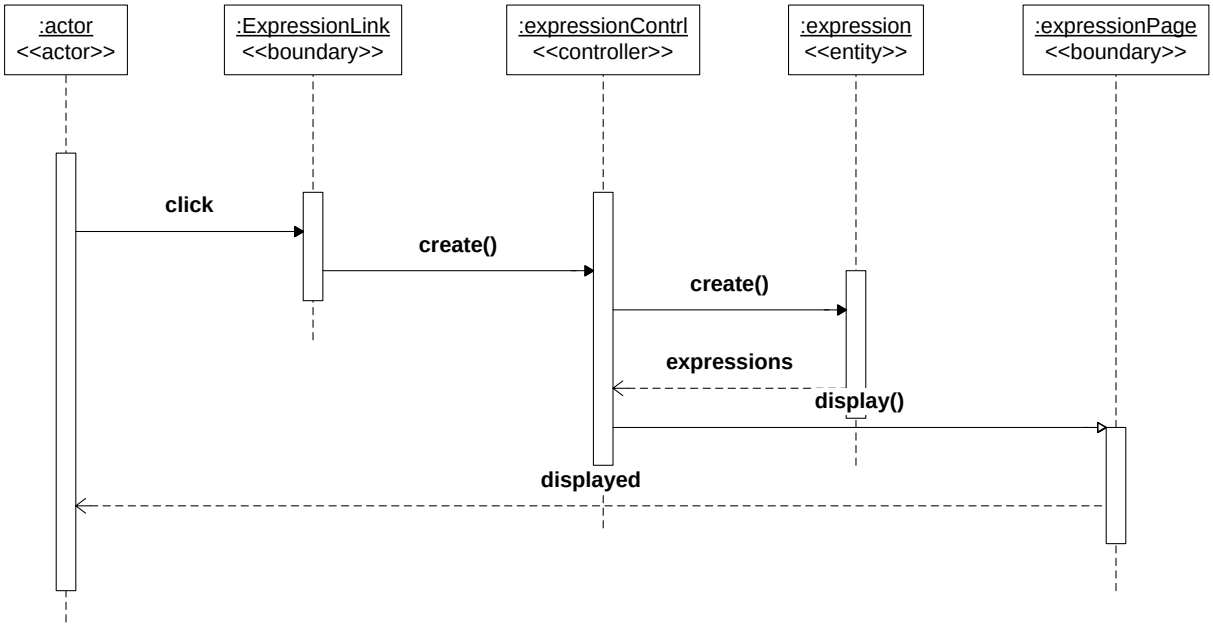

Figure 3.9 Sequence diagram for the use case ViewExpressions

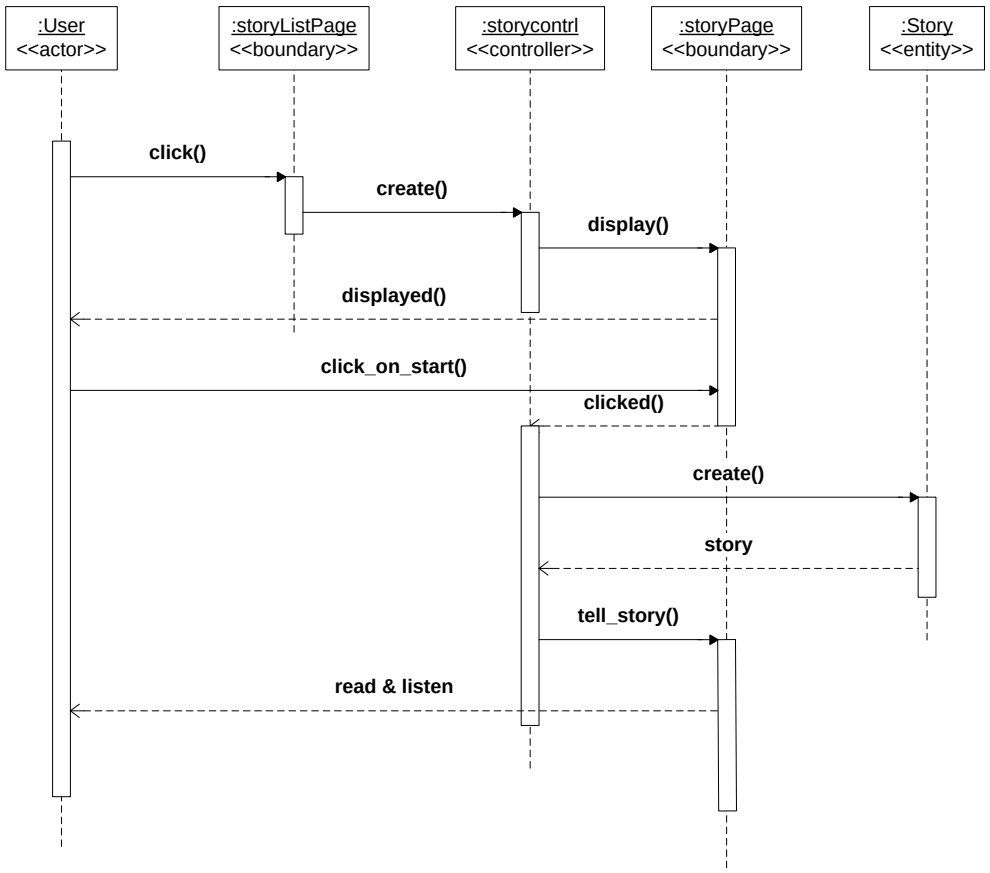

Figure 3.10 Sequence diagram for the use case ViewStory

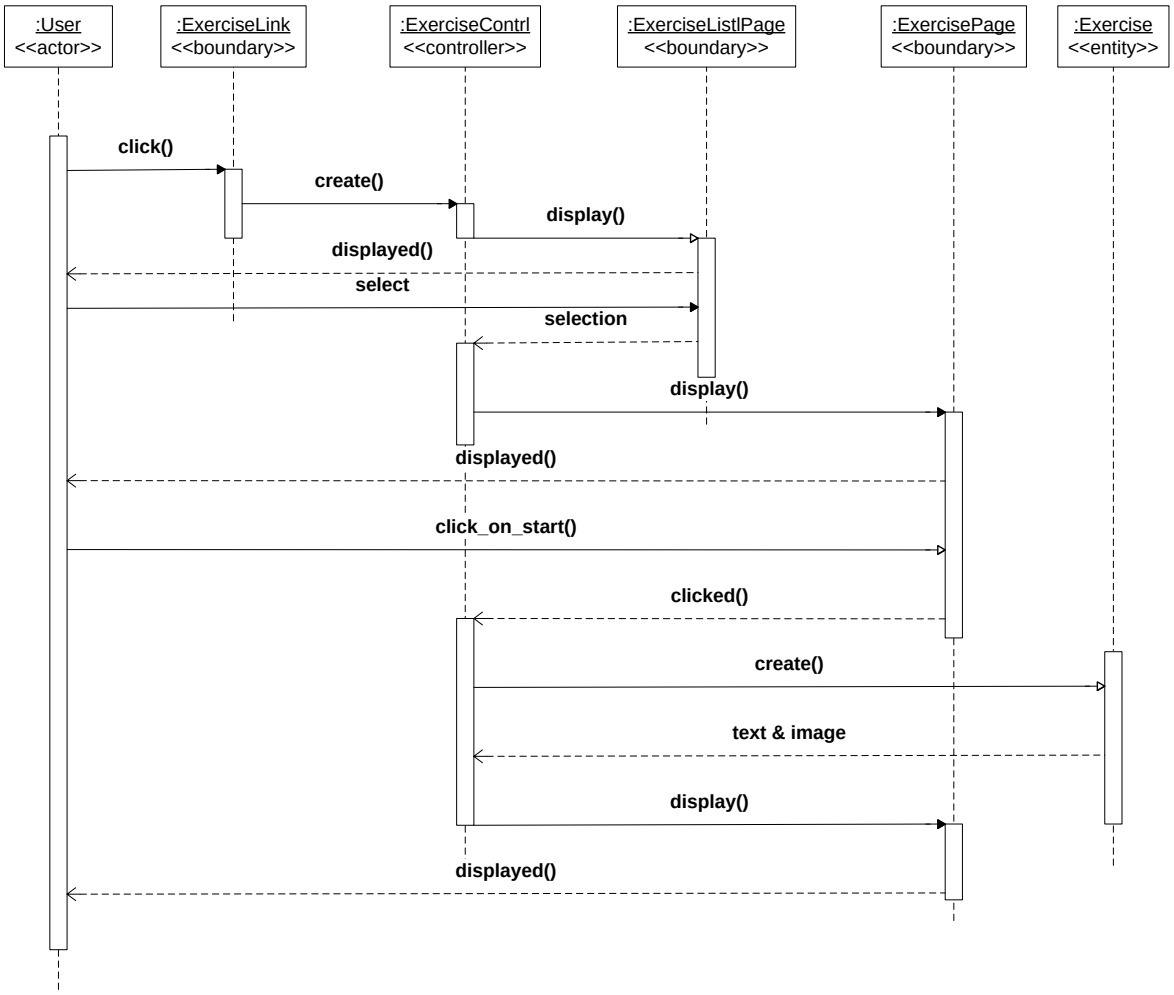

Figure 3.11 Sequence diagram for the use case doExercise

Chapter Four
System Design

System design is the transformation of the analysis model into a system design model. During system design, developers define the design goals of the project and decompose the system into smaller subsystems that can be realized by individual teams [18].

4.1. Language content design

The first thing that the learners of a new language need to know is alphabets. The early mastery of the skills of reading and writing, together with the independent and confident attitudes developed by children, has led naturally to an increase in individual study and exploration which is in line with current heuristic methods of learning [19]. However, in contrast, “Wolane is not a written language [2]”. As we have described earlier Wolane and Siltie are related languages. Moreover, Silt’e uses Geez alphabets including in educational institutions. Since at least the 1980s, Silt'e has been written in Ge'ez, or Ethiopic, writing system, originally developed for the now-extinct Ge'ez language [20]. As we have got from the brochure entitled ‘”Quality Education and Training For All”, published by the Ethiopian ministry of Education, Silti’e is one of the 23 languages which has been taught in the Silti’e zone as one subject including taking 10th grade national examination which is started last year. Most alphabets can be used with other languages that they were designed for [21]. Therefore, it is possible to use Geez as Alphabets of Wolane.

Our first intention is to teach the learners Geez letters as additionally, there are proverbs, poems and slogans written in Wolangna language using Geez alphabets. The proverbs of Wolangna language are written using Geez alphabets. There is also a dictionary which uses Geez alphabets to translate from Wolangna to Amharic language. As a result, it is possible to use Geez language for Wolangna as Silt’e is using Geez and moreover, there are many proverbs, poems and slogans written using Geez alphabets. Therefore, we are going to use Geez in order to teach Wolangna as it paves the way for understanding the language in an easy way.

The second thing we should bear in mind is teaching vocabulary. Like the previous research carried out in the field, the results indicated that a combination of text and still images resulted in significantly better incidental vocabulary learning [22]. Words are selected based on the book [23]. Hence, learners are taught words with pictures. Words are explained using text and picture.

The third step Next to word is conversation. Conversation is seen as central to language learning, because it is the “fundamental and universal form of language” and so is considered to be

“language at work”. It is considered to better prepare learners for real-life communication, where the entire conversation is more relevant than the analysis of specific utterances [24].

The fourth step is telling stories. TPRS (Teaching Proficiency through Reading and Storytelling) is a language teaching method designed to develop real fluency. Students and teachers spend class time speaking in the target language about interesting, comprehensible stories [25]. Students comprehend the stories by virtue of the live action visual aids and acquire the target vocabulary because it is repeated dozens of times within the daily story [26].

4.2. System Model

The system model represents entities that are part of the system [18].
The following section will describe the system in terms of subsystem decomposition and software/hardware mapping.

4.2.1. Sub-System Decomposition

The proposed system will be decomposed in terms of layers. The objective of subsystem decomposition is to reduce the complexity of the system in such a way that the subsystems are loosely coupled to each other and strongly cohesive internally. In our project the system is decomposed into four subsystems as Use interface subsystem, tutorial subsystem, exercise subsystem and persistent data management subsystem. Figure 4.1 is depicted in order to show the general dependencies of subsystems. For instance, tutorial management subsystem is dependent on both user interface and persistent data management subsystem. The dependency is described using the arrow. All of the subsystems are described briefly in table 4.1.

Layer 1 subsystem decomposition

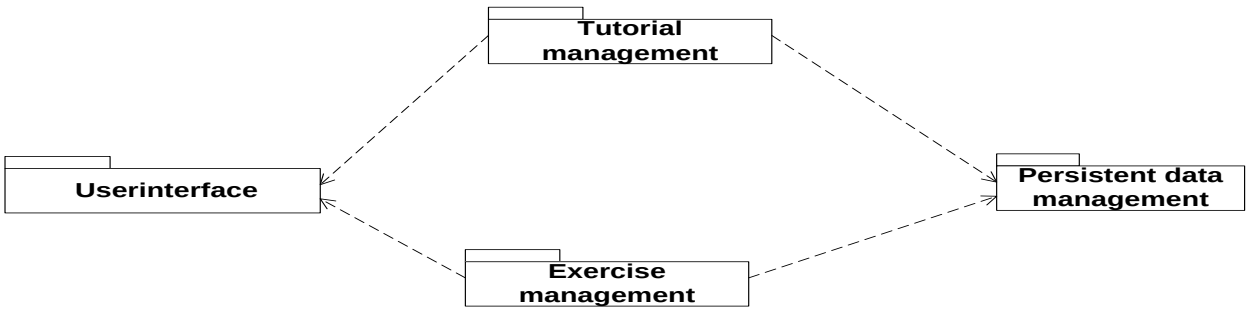

Figure 4.1 subsystem decomposition

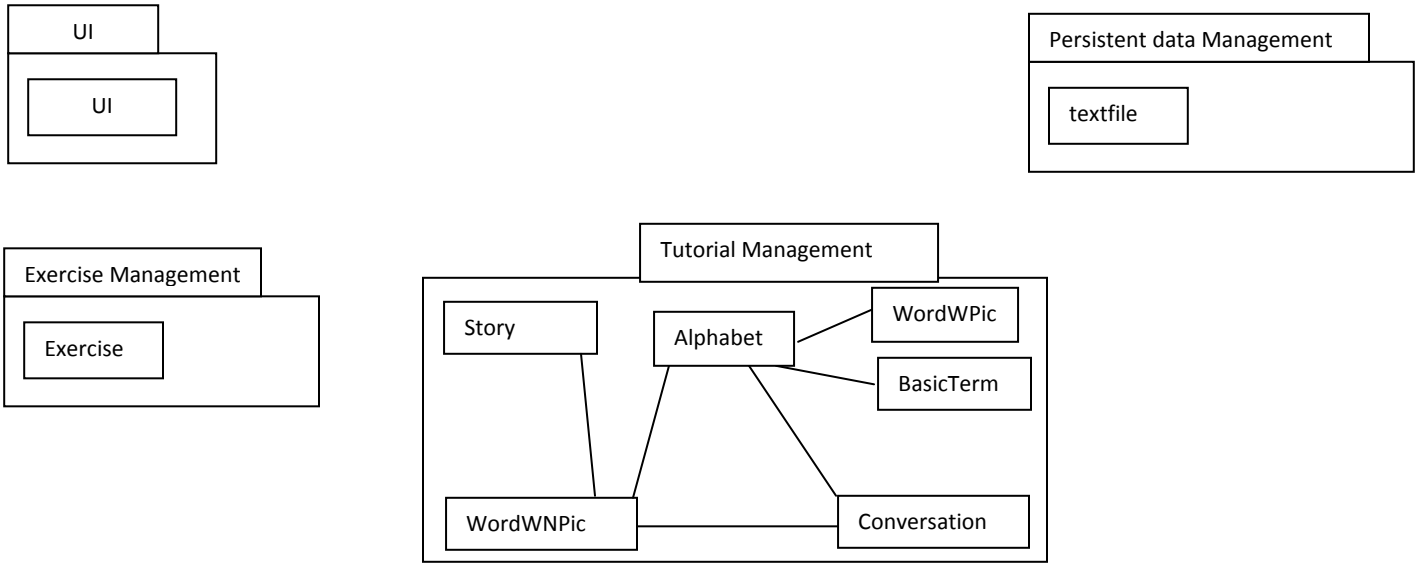

Figure 4.2 detailed Layer 2 subsystem decomposition

Figure 4.2 shows the detailed layer 2 subsystem decomposition including the classes included in each subsystem. In this figure, there is no dependency description showed in figure 4.1. As you can see above, inside each subsystem there is at least one class included in the subsystem. Subsystems are described below in the table.

Table 4.1 Subsystem description

Subsystem	**Subsystem description**
UI	Provides GUI for user to learn, exercise and search words, letters and common conversations.
Tutorial Management	Provides facilities to play sound, display text use the story tale facility. It is the main part wolane tutoring takes place.
Exercise	Provides facilities to increase learner's ability by providing different

Management	types of exercises to the user.
Persistent data Management	Provides the storage and manipulation facility.

4.2.2. Hardware Software Mapping

Hardware/Software mapping describes how subsystems are assigned to hardware and off-the-shelf components. The components are subsystems that provide services to other components or actors. It simply shows the hardware for the system & the software that is installed on the hardware. In this section, we will describe the allocation of the subsystems. As you can see all the subsystems are located in the mobile phone.

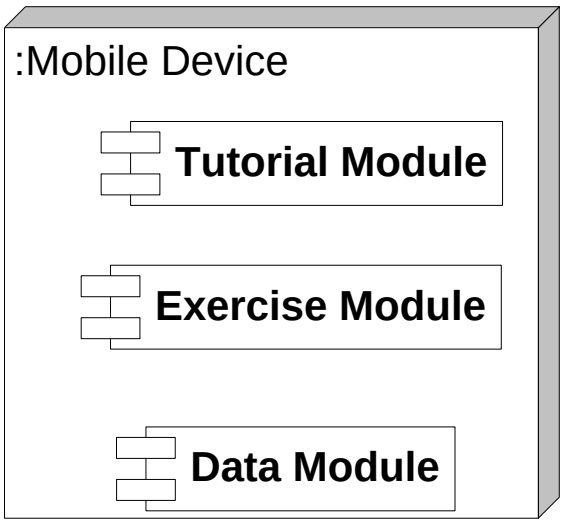

Figure 4.3 Software/Hardware Mapping

Figure 4.3 shows where the MWLLT system is deployed. As you can see all the modules are deployed on the mobile device which contrasts with the client/server.

Chapter Five
Implementation

In this section, the designs planned in the design phase are implemented as a prototype. The implementation process takes the design model and produces an equivalent executable representation [18].

5.1. The system development tools

5.1.1. Android SDK

For developing the application we use Android SDK as it provides the tools and APIs necessary to begin developing applications on the Android platform using the Java programming language. It includes a mobile device emulator — a virtual mobile device that runs on a computer. The emulator lets you develop and test Android applications without using a physical device. For editing and developing the UI, we use eclipse IDE since the tool is designed to give a powerful, integrated environment in which to build Android applications.

5.2. Prototype

In this subsection, we will discuss about the main interface of the system and we will some snapshots to show some of the interfaces. The interface displayed below is the main screen of the MWLLT. As you can see from the list the first one from the list is a link which gives information about the Wolane people. The entire list has link related with the text written on the list. We will have some snapshots starting from the next page to show the system's prototype.

Figure 5.1 shows the main screen of the system.

Figure 5.1 Main screen of the MWLLT

Figure 5.1 Main screen consists of the proposed MWLLT system layout including the texts on the list box. Each of the texts is connected with the corresponding pictures. When a user wants to see any of the pages, he/she has to select (press) the text from the list in the layout. Then the system is going to display the corresponding page.

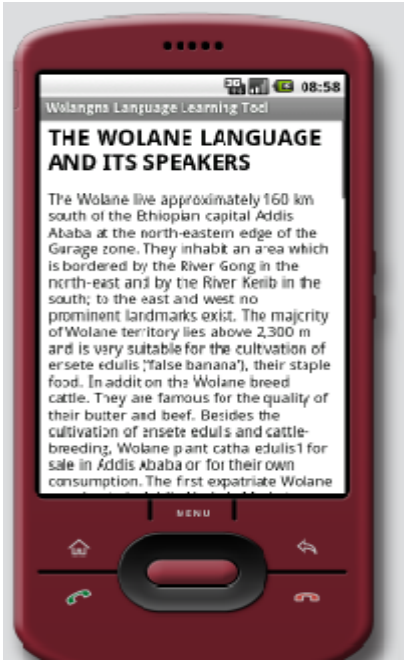

Figure.5.2. Lesson 1 people screen

Figure 5.2 is a page which displays about the Wolangna language speakers. It is a simple webpage display giving some information about the Wolane people. This is categorized under Lesson 1.

Figure 5.3 Lesson 3: Words

Figure 5.3 Shows the word tutorial which is categorized under Lesson 3. The user can use this function by clicking on Wolane texts which are at the middle. Transliterated text and the sound will be displayed.

Figure 5.4 Lesson 4: Evening Greetings Conversation

Figure 5.4 shows conversation example which is categorized under Lesson 4. It is about the evening greeting in Wolangna.

Figure 5.5 Lesson 7: Story Screen

Figure 5.5 shows the story tale page. Start the lesson, first you should select your alphabet and click on start button so as to start the story.

Chapter six
Usability Testing

6.1. Introduction

Testing is the process of finding differences between the expected behaviour specified by system models and the observed behaviour of the system. [18]

Usability testing focuses on validating the requirements elicitation model with the user through a variety of methods. Usability testing tests the user understanding of the use case model. Usability testing finds problems with the system specification by letting the user explore the system or only part of the system (e.g., the user interface). One of the factors that affect the acceptability of educational software is its usability. Educational researchers (even Master or PhD students) should not overlook usability testing, if they want to develop educational software that is efficient, effective and gives satisfaction to the user.

6.2. Purpose of testing

The goal of testing as illustrated by Bruegge, B. and Allen D. [18] is to provide a framework that can be used by managers and testers to plan and execute the necessary tests in a timely and cost-effective manner.

6.3. User Profile

Most of the researchers agree that there are two types of evaluators: experts and users. Expert evaluations involve a review of educational software, according to accepted usability principles. Participants (users) have to be representative of the target population to evaluate the degree to which a product meets specific usability criteria. So, we have selected end-product evaluators based on the aforementioned criteria (Experts and Users).

Evaluators are selected as follows:

a. Two linguistic experts to evaluate the contents the language and sequences of language teaching.
b. Two software developers to evaluate the features of the system. Male and female.
c. Four people who cannot speak Wolangna language to check whether the tool can make them learn the language. Two male and two female.
d. Three Wolangna language speakers to evaluate the contents of the language. One two male and two female.
e. Four children of Wolangna language speakers who cannot speak Wolangna whose age is less than 18. Two male and female.

6.4. Methods

The different methods imply different types of evaluators, different number of users, and different types of data to be collected. There are four types of methods beneficent for evaluating the system: expert evaluation, observational evaluation, survey evaluation and experimental evaluation.

From the aforementioned methods, we have used a survey method to perform usability test. Surveys are employed to know users' opinions or to understand their preferences about an existing or potential product through the use of interviews or questionnaires.

6.5. Task list

In evaluating the system, there are list of tasks that must be undertaken to make precise testing. The following are the tasks must be fulfilled to have the correct feedback from the evaluators:

a) First, the participants should see the system deeply.
b) Each of the participants will be given a questionnaire, and asked to complete it before leaving.
c) However, if a participant is in a rush, he/she will be asked to take the questionnaire with them, complete it, and return it

This is how made the evaluation to have a precise feedback from the different evaluators from different background.

6.6. Test environment and equipment requirements

As the system is a mobile-based, we need to have a cell phone but with no place preferences. We can show them anywhere and anytime.

6.7. Monitor role

In this sense, a monitor we mean the person undertaking the supervising of the users. Here, his role is to show the system, distribute questionnaire, collect questionnaire, and making analysis based on the users' feedback.

6.8. Evaluation and results

As we have said previously, the method we have used is survey method. We have evaluated the MWLLT according to the following criteria using the questionnaire displayed in each of the title listed below:

The following are the questionnaire prepared to cross-check users understanding about the usability of the Mobile-based Wolangna Language Learning Tool (MWLLT)

Table 7.1 Questionnaire

		Strongly agree(5)	Agree(4)	Neutral (3)	Disagree (2)	Strongly Disagree (1)
	a. Users instruction comprehension					
1	Do you think the use of terminology throughout system is consistent?					
2	Do you think terminologies are related well to the work you are doing?					
3	Do you think Messages which appear on screen are clear?					
4	Do you think the steps to complete a task follow a logical sequence?					
5	Do you think number of steps per task is right?					
6	Do you think tasks can be performed in a straight-forward manner?					
	b. Screen layout					
7	Do you think the characters on the mobile screen easy to read?					
8	Do you think the screen layouts were helpful?					
9	Do you think the sequence of screens is clear?					
	c. Multimedia					
10	Do you think the sound output is audible?					
11	Do you think the quality of pictures is natural?					
12	Do you think the colors used are good enough?					
	d. Utility of the system to the society					
13	Do you think the system is good enough to teach the language?					
14	Do you think it is usable to the society?					
15	Do you think the tool can make a difference in preserving the language of the society?					

e. System capabilities						
16	Do you think response time for most operations is fast enough?					
17	Do you think rate of information displayed is enough?					
18	Do you think you can easily accomplish tasks knowing only a few commands?					

Please write Your feeling about the MWLLT system:_____
_____
_____
_____
_____
_____

A survey has been done using the questionnaire displayed in table 7.1 to cross-check whether the system can make a difference in improving the learner's ability to be a speaker of Wolangna language. Our objective here is to evaluate the system and elicit information about the system. Thus, 15 users have been selected to use the system. After the users have seen all the functionalities of the system, we have distributed the questionnaires to them. It has 18 items and one free space for comment writing. Then, they have told to fill the questionnaires. The questionnaires consisted of specific questions and space to write their general opinion about the system which is used to identify users' degree of satisfaction. The questionnaires formed based on 5-point scale. They are word-based. Strongly agree, agree, neutral, disagree and strongly disagree are equivalent to 5, 4, 3, 2, 1 respectively.

After collecting the questionnaire, we have got the following result from the participants shown in table 7.2.

Table 7.2 result of the questionnaire

	average	In percent (%)
Users instruction comprehension	4.75	95%
Screen layout	4.8	96%
Multimedia	4.69	93.8%
Utility of the system to the society	4.57	91.1%
System capabilities	4.57	91.1%

As you can see from the above table, all the results are above 90% which shows the system is good enough to teach Wolangna language. Moreover, user satisfaction is measured from the comments written by each evaluator. Based on the feedback we have got from users, the comments on the questionnaire show that users are satisfied with the system.

Chapter Seven
Conclusion and Future Work

7.1. Conclusion

People need to preserve their culture as they inherited from their ancestors for the sake of keeping their identity. Language is one of the assets categorized under culture which should be transferred from generation to generation. There are a number of ways to keep and transfer one's language from generation to generation. One of them is developing a mobile-based language learning tool. Wolangna is one of the Ethiopian languages that should be kept and transferred as it is.

To transfer the language from generation to generation, we have developed a Mobile-based Wolagna Language Learning Tool (MWLLT). The tool teaches in anytime anywhere manner. The system teaches Letters, words, conversations and others. The system also has story tale topic which can improve the learner's ability in the language.

7.2. Future work

As a future work, the tool can be extended to other mobile platforms because this system runs only on android operating system. This gives the facility to be used by many other people. In this system, there is a concatenated speech synthesis which has a robotic sound. This feature can be improved by developing a better speech synthesis. The system is also stand-alone. The amount of data that the system can store is limited. This can improve by making the system client server based.

References

[1] Xinghong Liu, “Applied Research on the Mobile Learning in Foreign Language”, Journal, Second International Conference on Education Technology and Training, 2009, pp: 309-312.

[2] Ronny Meyer, “Wolane, Descriptive of as Gurage language (Ethiosemetic)”, Book, Addis Ababa University, Ethiopia, 2006, pp: 1-16

[3] Sobah Abbas Petersen & Jan-Kristian Markiewicz, “PALLAS: Personalised Language Learning on Mobile Devices”, Journal, NTNU, Trondheim, Norway, 2008, pp: 55-58.

[4] http://netlearnnow.com/(last accessed on April 02, 2012)

[5] Joachim Crass, Ronny Meyer, “The Qabena and the Wolane: Two peoples of the Gurage region and their respective histories according to their own oral traditions”, Journal, Addis Ababa University, Ethiopia, 2001, pp: 177

[6] Andrew Rice_ Paula Buttery Idris A. Rai Alastair Beresford, “Language learning on a next-generation service platform for Africa”, Journal, Research Centre for English and Applied Linguistics, University of Cambridge, UK, 2009, pp: 3

[7] http://www.newsdire.com/news/730-the-number-of-internet-users-in-ethiopia-will-jump-to-12-million.html(last accessed on April 03, 2012)

[8] http://mashable.com/follow/topics/mobile-2.0(last accessed on April 22, 2012)

[9] http://www.gartner.com/it/page.jsp?id=1759714 (last accessed on April 25, 2012)

[10] http://www.newupcomingcellphones.info/p/mobile-operating-system-os.html (last accessed on April 23, 2012)

[11] Sah ilu Wendeson, Wan Fatimah Wan Ahmad, Nazleeni Sam iha Haron, “Development of Mobile Learning Tool”, Journal, Computer & Information Sciences Department Universiti Teknologi PETRONAS (UTP), Malaysia, 2010, pp:139

[12] George M. Chinnery, “Emerging Technologies Going to the MALL: Mobile Assisted Language Learning”, Journal, University of Maryland Baltimore County, 2006, pp: 10

[13] Timothy G. Collins, Ph.D., “English Class on the Air: Mobile Language Learning with Cell Phones”, Journal, National College of Education, National-Louis University, Chicago, USA, 2005, pp: 2

[14] Agnes Kukulska-hulme, “An overview of mobile assisted language Learning”, Journal, The Institute of Educational Technology, The Open University, UK, 2008, pp: 274

[15] Chih-Ming Chen & Ching-Ju Chung, “Personalized mobile English vocabulary learning system based on item response theory and learning memory cycle”, Journal, Graduate Institute of Library, Information and Archival Studies, National Chengchi University, Taiwan, 2008, pp: 627-629

[16] Glenn Stockwell, “Vocabulary on the Move: Investigating an intelligent mobile phone-based vocabulary tutor”, Journal, Waseda University, Tokyo, Japan, 2007, pp: 371-374

[17] Axumite tasew “Mobile Based Amharic Language Learning Tool”, M.Sc. Thesis, 2011, pp: 1, Addis Ababa University, Addis Ababa, Ethiopia.

[18] Bruegge B. and Allen Dutoit.”Object-Oriented Software Engineering: Conquering Complex and Changing Systems”, Book, Prentice hall PTR, 1999, pp: 23-26, 167 & 465

[19] http://www.barnsdle.demon.co.uk/spell/itaaddis.html(last accessed on April 05, 2012)

[20] http://yomi.mobi/egate/Silt%27e_language___sharp___Sounds_and_orthography/a.(last accessed on April 10, 2012)

[21] http://www.thecabal.org/gurps/rareitems/literacy.html(last accessed on April 05, 2012)

[22] Seyyed Abdollah Shahrokni, “Second Language Incidental Vocabulary Learning: The Effect of Online Textual, Pictorial, and Textual Pictorial Glosses”, Journal, Iran University of Science and Technology (IUST), Iran, 2009, retrieved from http://www.tesl-ej.org/wordpress/issues/volume13/ej51/ej51a3/

[23] Alem Eshetu, “Amharic For Beginners”, Book, 6th Edition, 2011, pp: 127-147

[24] http://www.douban.com/group/topic/15019269/(last accessed on April 05, 2012)

[25] Karen Lichtman, “Research on TPR Storytelling”, Journal, University of Illinois, 2011, pp: 1,

[26] http://www.tprstories.com/(last accessed on April 05, 2012)

[27] http://www.e-learningconsulting.com/consulting/what/e-learning.html (last accessed on April 02, 2012)

[28] http://mattters.com/learning/news/charlie-murphy/ (last accessed on June 30, 2012)

[29] http://www.education.com/reference/article/what-impact-technology-learning/(last accessed on June 30, 2012)

[30] http://answers.yahoo.com/question/index?qid=20070911125557AAQ8tfg(last accessed on April 05, 2012)

[31] Dr. Tayseer Andrawes Saleem, “mobile learning technology: a new step in e-learning”, journal, department of information technology and library, Irbid University College, AL-Balqa Applied University, Jordan, 2011, pp: 126

[32] T. Altameem, “Contextual Mobile Learning System for Saudi Arabian Universities”, journal, Dept. of Computer Science, King Saud University, Saudi Arabia. 2011, pp: 22-23

[33] Wu Junqi, “3G Phone-based Mobile Learning for Improving K-12 Tearchers’Educational Technology in Rural Area”, journal, Department of Information Technology HuaZhong Normal University, Wuhan, China, 2010, pp: 823

[34] Yi Jin, “Research of One Mobile Learning System”, journal , Computer Science Department, Guiyang University Guiyang, China, journal, Dept. of Computer Science, King Saud University, Saudi Arabia. 2009, pp: 162-164

[35] Eric Klopfer, “Environmental Detectives: PDAs as a Window into a Virtual Simulated World”, journal, MIT Teacher Education Program, Massachusetts Institute of Technology, Cambridge. 2002, pp: 95 - 98

[36] Ki Chune Nah, Peter White and Roland Sussex, “The potential of using a mobile phone to access the Internet for learning EFL listening skills within a Korean context”, journal, School of Languages and Comparative Cultural Studies, The University of Queensland, Brisbane, Australia 2008, pp: 334-336

[37] http://www.microsoft.com/uk/education/connected-education/elearning.aspx/ (last accessed on April 02, 2012)

Appendix A

The following code sample shows the Wolane.java file which is used to display the application main screen.

```
package com.example;

import android.app.AlertDialog;

import android.app.Dialog;

import android.app.ListActivity;

import android.content.DialogInterface;

import android.content.Intent;

import android.os.Bundle;

import android.view.View;

import android.view.ViewGroup;

import android.widget.ArrayAdapter;

import android.widget.ImageView;

import android.widget.ListView;

import android.widget.TextView;


public class Home2 extends ListActivity {

        TextView selection;

        long a;

         private textDisplay td=new textDisplay();

        private static final String[] items={"Lesson 1: People","Lesson 2: Letters","Lesson 3:
Words","Lesson 4: Conversation","Lesson 5: Basic terms","Lesson 6: Expressions","Lesson 7:
Stories","Exercise","Dictionary"};

        @Override

        public void onCreate(Bundle icicle) {

        super.onCreate(icicle);

        //setContentView(R.layout.main);
```

```
    setListAdapter(new IconicAdapter());
    selection=(TextView)findViewById(R.id.selection);
    }
    public void onListItemClick(ListView parent, View v,
    int position, long id) {

            StringBuilder COUNTRIE =td.readfromfile("dictionary/alert.txt");
String COUNTRIES=COUNTRIE.toString();
String A[]=COUNTRIES.split("  :");
            a=this.getListAdapter().getItemId(position);
            if (a==0)
            {
                    tips(A[0]);
            }
            else if (a==1)
            {
                    tips(A[1]);
            }
            else if (a==2)
            {
                    tips(A[2]);
            }
            else if (a==3)
            {
                    tips(A[3]);
            }
            else if (a==4)
```

```
		{
			tips(A[4]);
		}
		else if (a==5)
		{
			tips(A[5]);
		}
		else if (a==6)
		{
			tips(A[6]);
		}
		else if (a==7)
		{
			Intent i = new Intent(v.getContext(),Exercise.class);
			startActivityForResult(i, 0);
		}
		else if (a==8)
		{
			Intent i = new Intent(v.getContext(),Dictionary2.class);
			startActivityForResult(i, 0);
		}


			}
class IconicAdapter extends ArrayAdapter<String> {
IconicAdapter() {
super(Home2.this, R.layout.row, R.id.label, items);
}
```

```
public View getView(int position, View convertView,
ViewGroup parent) {
View row=super.getView(position, convertView, parent);
ImageView icon=(ImageView)row.findViewById(R.id.icon);
String s = items[position];
    if (s.startsWith("Lesson 1: People"))
                    {
            icon.setImageResource(R.drawable.peo1);
}
else if (s.startsWith("Lesson 2: Letters")){
            icon.setImageResource(R.drawable.ha1);
}
else if (s.startsWith("Lesson 3: Words")){
            icon.setImageResource(R.drawable.wor1);
}
else if (s.startsWith("Lesson 4: Conversation")){
            icon.setImageResource(R.drawable.con1);
}
else if (s.startsWith("Lesson 5: Basic terms")){
            icon.setImageResource(R.drawable.terms);
}
else if (s.startsWith("Lesson 6: Expressions")){
            icon.setImageResource(R.drawable.exp1);
}
else if (s.startsWith("Lesson 7: Stories")){
            icon.setImageResource(R.drawable.sto1);
}
```

```
        else if (s.startsWith("Exercise")){
                icon.setImageResource(R.drawable.ex1);
        }
        else if (s.startsWith("Dictionary")){
                icon.setImageResource(R.drawable.dic);
        }

        return(row);
        }
        }

        public void tips(String A){

                AlertDialog.Builder builder = new AlertDialog.Builder(this);

        builder.setMessage(A).setTitle("How to use it").setPositiveButton("Ok", new
DialogInterface.OnClickListener() {
public void onClick(DialogInterface dialog, int id) {
      if(a==0){
            Intent i = new Intent(((Dialog) dialog).getContext(),About.class);
       startActivityForResult(i, 0);
   }
   else if(a==1){
                Intent i = new Intent(((Dialog) dialog).getContext(),Letters.class);
                startActivityForResult(i, 0);
                   }
   else if(a==2){
                Intent i = new Intent(((Dialog) dialog).getContext(),DynamicDemo.class);
```

```
                startActivityForResult(i, 0);
                    }
    else if(a==3){
                Intent i = new Intent(((Dialog) dialog).getContext(),Conversation1.class);
                startActivityForResult(i, 0);
                    }

    else if(a==4){
                Intent i = new Intent(((Dialog) dialog).getContext(),Important.class);
                startActivityForResult(i, 0);
                    }
    else if(a==5){
                Intent i = new Intent(((Dialog) dialog).getContext(),Express.class);
                startActivityForResult(i, 0);
                    }
    else if(a==6){
                Intent i = new Intent(((Dialog) dialog).getContext(),Story.class);
                startActivityForResult(i, 0);
                    }
    else if(a==7){

                    }
    else if(a==8){

                    }

}
```

```
});

        AlertDialog alert = builder.create();
    alert.show();




        }



        }
```

This is the layout of the application main screen

```
<?xml version="1.0" encoding="utf-8"?>
<AbsoluteLayout xmlns:android="http://schemas.android.com/apk/res/android"
   android:orientation="vertical"
   android:layout_width="fill_parent"
   android:layout_height="fill_parent"
   android:background="@drawable/new2"
   >
 <ImageButton android:layout_height="wrap_content" android:src="@drawable/people"
android:id="@+id/people1" android:layout_width="wrap_content" android:layout_x="10dp"
android:layout_y="10dp"></ImageButton>
 <ImageButton android:layout_height="wrap_content" android:src="@drawable/alphabet2"
android:id="@+id/alphabet1" android:layout_width="wrap_content" android:layout_x="110dp"
android:layout_y="10dp"></ImageButton>
 <ImageButton android:layout_height="wrap_content" android:src="@drawable/vocabulary"
android:id="@+id/vocabulary1" android:layout_width="wrap_content" android:layout_x="210dp"
android:layout_y="10dp"></ImageButton>
```

```
   <TextView    android:layout_width="106px" android:layout_height="wrap_content"
android:layout_x="10px"   android:layout_y="90px"  android:textSize="9pt"   android:id="@+id/About2"
android:text="  People"  android:textStyle="bold"   android:textColor="#ffcccccc"
android:isScrollContainer="true" android:keepScreenOn="true" android:longClickable="true"
android:focusableInTouchMode="true"/>

   <TextView    android:layout_width="106px" android:layout_height="wrap_content"
android:layout_x="116px"  android:layout_y="90px"  android:textSize="9pt"
android:id="@+id/Letters2"    android:text=" Letters"  android:textStyle="bold"
android:textColor="#ffccccff" android:isScrollContainer="true" android:keepScreenOn="true"
android:longClickable="true" android:focusableInTouchMode="true"/>

   <TextView    android:layout_width="106px" android:layout_height="wrap_content"
android:layout_x="222px"  android:layout_y="90px"  android:textSize="9pt"
android:id="@+id/Vocabulary2"  android:text="Words"  android:textStyle="bold"
android:textColor="#ffcccccc" android:isScrollContainer="true" android:keepScreenOn="true"
android:longClickable="true" android:focusableInTouchMode="true"/>

  <ImageButton android:layout_height="wrap_content" android:src="@drawable/conversation"
android:id="@+id/conversation1" android:layout_width="wrap_content" android:layout_x="10dp"
android:layout_y="115dp"></ImageButton>

  <ImageButton android:layout_height="wrap_content" android:src="@drawable/story"
android:id="@+id/story1" android:layout_width="wrap_content" android:layout_x="110dp"
android:layout_y="115dp"></ImageButton>

  <ImageButton android:layout_height="wrap_content" android:src="@drawable/important"
android:id="@+id/important1" android:layout_width="wrap_content" android:layout_x="210dp"
android:layout_y="115dp"></ImageButton>

   <TextView    android:layout_width="106px" android:layout_height="wrap_content"
android:layout_x="10px"   android:layout_y="195px"  android:textSize="9pt"
android:id="@+id/Conversation2"        android:text="  Conv'n"    android:textStyle="bold"
android:textColor="#ffcccccc" android:isScrollContainer="true" android:keepScreenOn="true"
android:longClickable="true" android:focusableInTouchMode="true"/>

   <TextView    android:layout_width="106px" android:layout_height="wrap_content"
android:layout_x="110px"  android:layout_y="195px"  android:textSize="9pt"
android:id="@+id/StoryTale2"    android:text="   Story"    android:textStyle="bold"
android:textColor="#ffccccff" android:isScrollContainer="true" android:keepScreenOn="true"
android:longClickable="true" android:focusableInTouchMode="true"/>

   <TextView    android:layout_width="106px" android:layout_height="wrap_content"
android:layout_x="210px"  android:layout_y="195px"  android:textSize="9pt"
android:id="@+id/important2"      android:text="Important" android:textStyle="bold"
android:textColor="#ffccccff" android:isScrollContainer="true" android:keepScreenOn="true"
android:longClickable="true" android:focusableInTouchMode="true"/>
```

```
 <ImageButton android:layout_height="wrap_content" android:src="@drawable/expressions"
android:id="@+id/expressions1" android:layout_width="wrap_content" android:layout_x="10dp"
android:layout_y="220dp"></ImageButton>

 <ImageButton android:layout_height="wrap_content" android:src="@drawable/dictionary"
android:id="@+id/dictionary1" android:layout_width="wrap_content" android:layout_x="110dp"
android:layout_y="220dp"></ImageButton>

 <ImageButton android:layout_height="wrap_content" android:src="@drawable/exercise"
android:id="@+id/exercise1" android:layout_width="wrap_content" android:layout_x="210dp"
android:layout_y="220dp"></ImageButton>

  <TextView  android:layout_width="106px" android:layout_height="wrap_content"
android:layout_x="10px"  android:layout_y="300px"  android:textSize="9pt"
android:id="@+id/expresssions2"  android:text= "Expresss"  android:textStyle="bold"
android:textColor="#ffccccff" android:isScrollContainer="true" android:keepScreenOn="true"
android:longClickable="true" android:focusableInTouchMode="true"/>

  <TextView  android:layout_width="106px" android:layout_height="wrap_content"
android:layout_x="110px"  android:layout_y="300px"  android:textSize="9pt"
android:id="@+id/dictionary2"  android:text="Dictionary"  android:textStyle="bold"
android:textColor="#ffccccff" android:isScrollContainer="true" android:keepScreenOn="true"
android:longClickable="true" android:focusableInTouchMode="true"/>

  <TextView  android:layout_width="106px" android:layout_height="wrap_content"
android:layout_x="210px"  android:layout_y="300px"  android:textSize="9pt"
android:id="@+id/exercise2"  android:text=" Exercise"  android:textStyle="bold"
android:textColor="#ffccccff" android:isScrollContainer="true" android:keepScreenOn="true"
android:longClickable="true" android:focusableInTouchMode="true"/>

 <ImageButton android:layout_height="wrap_content" android:src="@drawable/speech"
android:id="@+id/speech1" android:layout_width="wrap_content" android:layout_x="10dp"
android:layout_y="325dp"></ImageButton>

 <ImageButton android:layout_height="wrap_content" android:src="@drawable/help"
android:id="@+id/help1" android:layout_width="wrap_content" android:layout_x="110dp"
android:layout_y="325dp"></ImageButton>

 <ImageButton android:layout_height="wrap_content" android:src="@drawable/online"
android:id="@+id/online1" android:layout_width="wrap_content" android:layout_x="210dp"
android:layout_y="325dp"></ImageButton>

  <TextView  android:layout_width="106px" android:layout_height="wrap_content"
android:layout_x="10px"  android:layout_y="400px"  android:textSize="9pt"
android:id="@+id/speech2"  android:text="  Speech"  android:textStyle="bold"
android:textColor="#ffccccff"  android:isScrollContainer="true" android:keepScreenOn="true"
android:longClickable="true" android:focusableInTouchMode="true"/>
```

```
<TextView android:layout_width="106px" android:layout_height="wrap_content"
android:layout_x="110px" android:layout_y="400px" android:textSize="9pt"
android:id="@+id/help2" android:text=" Help" android:textStyle="bold"
android:textColor="#ffccccff" android:isScrollContainer="true" android:keepScreenOn="true"
android:longClickable="true" android:focusableInTouchMode="true"/>

<TextView android:layout_width="106px" android:layout_height="wrap_content"
android:layout_x="210px" android:layout_y="400px" android:textSize="9pt"
android:id="@+id/Online2" android:text=" OnLine" android:textStyle="bold"
android:textColor="#ffccccff" android:isScrollContainer="true" android:keepScreenOn="true"
android:longClickable="true" android:focusableInTouchMode="true"/>


<TextView

android:id="@+id/selection"

android:layout_width="fill_parent"

android:layout_height="wrap_content"

android:text="@string/hello"

/>
```

Declaration

This project is my original work and has not been submitted as partial requirement for a degree in any university.

Name: Dawed Nesru

Signature: _____

Date: _____

Confirmed by advisor:

Name: Dida Midekso (PhD)

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Date: _____

Place and date of submission: Addis Ababa, Jun, 2012.