

IMPLEMENTATION OF VOICE RECOGNITION TECHNOLOGY ON ENGLISH LEARNING APPLICATION BY SELF LEARNING BASED ON ANDROID DEVICE

**Derwin Suhartono^{*}, Calvin, Mery Yustina, Shandy Kurniawati,
Haryono Soeparno, Fredy Purnomo**

Computer Science Department, School of Computer Science, Bina Nusantara University
Jl. K.H. Syahdan 9, Kemanggisian, Jakarta Barat 11480

^{*}Email: dsuhartono@binus.edu

Abstract

Nowadays, English is going global; it has forced almost all parts of the world to use English as the main communication language. The growth of media needs to learn English is also run rapidly. This prompted the need of many tools or media that can be used as a tool to learn English well. In this research, the application development as a learning device for self-learning using Android is done by embedding voice recognition technology in it. The method used here is embedded speech recognition method. Embedded speech recognition method is often used in mobile application and it is simpler than either network speech recognition or distributed speech recognition. This is due to the lack of signal transmission from the client to the remote server. The application is developed to support English learning especially for listening and speaking.

Keywords: *Android, English, Self Learning, Voice Recognition*

Abstrak

Bahasa Inggris yang terus mengglobal pada saat ini telah mendorong hampir seluruh belahan dunia menggunakan Bahasa Inggris sebagai komunikasi. Kebutuhan media belajar Bahasa Inggris untuk masyarakatpun menjadi semakin meningkat. Hal ini mendorong diperlukannya berbagai alat atau media yang dapat digunakan sebagai tools untuk belajar Bahasa Inggris dengan baik. Pada penelitian ini dilakukan pembangunan aplikasi sebagai perangkat pembelajaran secara self learning pada device Android yang menggunakan teknologi voice recognition. Metode yang digunakan adalah metode embedded speech recognition. Metode embedded speech recognition sering digunakan pada aplikasi berbasis mobile device dan lebih sederhana dibandingkan network speech recognition ataupun distributed speech recognition. Hal ini dikarenakan tidak ada pengiriman signal dari client ke remote server. Aplikasi ini dibangun untuk mendukung pembelajaran bahasa Inggris khususnya untuk listening dan speaking

Kata kunci: *Android, Bahasa Inggris, Self Learning, Voice Recognition*

1. INTRODUCTION

Language is the most important communication tools. Currently, English dominates all aspects of communication. Most of the countries in Asia are using English as the medium of instruction or they make English as a second language after their national language (Rore, 2012). In a modern world which fulfilled by challenges and super tight competition, everyone is advised not only to have high level education, but also have special skills, in which language is included in them.

Lauder (2008) said that the dependencies between countries in the world led to the raise of society needs to learn foreign languages, especially English as an international language. It aims to communicate one to another among people in any countries in the world. According to Bolton (2008), there is approximately 5% of Indonesia's population or about 12 million people in Indonesia are English speakers today. However, Indonesia is at the 34th position of 44 countries in the world whose people is not a native English.

Because of the importance of English usage, then it is needed to increase the public awareness of English skills. One way that can be done is to join English course at certain institutions. There should also be special exercises to support in English learning.

Higher mobility is also a consideration. Most people continue to interact with other people by using their gadgets. So, it would be better if an application is put into gadgets for learning especially in English learning. This research is to build English learning apps on smart phone based on Android by inserting voice recognition feature as special tool for user to practice the pronunciation of the English word. As learning is addressed to professionals, then the application is built using English which is often used for the professionals (Business English).

2. METHODOLOGY

2.1 Fundamental Theory

2.1.1 Self Learning

According to Hughes & Berry (2011), self learning or self directed learning is a learning activity in which the students have their responsibility in planning the learning materials. Students have their control to the learning process. Students can also determine the way how they learn, where they learn, and when they will learn.

Based on Hughes & Berry which is cited from Knowles (2011), there are two main principles in self learning. These principles are:

1. Self teaching

This happens when the student takes the initiative upon themselves to look for learning tools and resources needed to make them understand about the knowledge and skills required.

2. Personal autonomy

A principle which refers to the students to set learning goals

2.1.2 Business English

Referring to the statement proposed by Zhang (2007), Business English is an international business communication learning system on social and economic field. The participants will be directed to study business procedures insides. Business English is part of English for Specific Purpose (ESP). English for Specific Purpose is an approach used to learn English in which its characteristics are to meet the needs of the students.

2.1.3 Voice Recognition

Based on the definition stated by Tan and Lindberg (2008) which refers to the opinion of Deller, voice recognition or commonly known as speech recognition is the process of translating voice signal to a sequence of words. They said that there are three kinds of approaches in voice recognition, namely:

- a. Network Speech Recognition (NSR)

Network Speech Recognition (NSR) is an approach to perform speech recognition by using conventional speech coders to transmit sound from user device to recognition server. Network speech recognition is usually used in telephone conversations.

- b. Distributed Speech Recognition (DSR)

Distributed Speech Recognition (DSR) is a remote speech recognition which adopts client-server architecture by placing feature extraction in client side and computation intensive recognition decoding in server side.

- c. Embedded Speech Recognition (ESR)

Embedded Speech Recognition (ESR) is a speech recognition approach which is used for mobile devices such as mobile phone, PDA, and games tools. ESR is done by putting all speech recognition process on mobile target or user's tools. ESR is a speech the simplest speech recognition compared with two previous approaches, which are Network Speech Recognition (NSR) and Distributed Speech Recognition (DSR). This is because the embedded speech recognition doesn't have signal or data transmission process from client to remote server.

2.2 Previous Work

Some research has been conducted in several countries in order to improve English skills. This shows people's high interest of English.

Lu (2008) conducted an experiment by using paper media and short message service via mobile phone to learn vocabulary. It aims to determine the effectiveness level of learning by using mobile. From the evaluation results, it is found that students who learned through this media have a higher vocabulary improvement. McConatha et al. (2008) conducted a study which could be said to be a continuation of Lu. They measured the effectiveness of mobile learning using HotLava Software's Learning Mobile Author. The results indicate that students who learn English by using that software have a greater grade than those who only use the class review handouts.

Tewari et al. (2010) gives teaching strategy to the pronunciation of English words by using games. The game uses speech recognition technology. Evaluation of the results obtained that group of students who learn through games with speech recognition has a good improvement to words. Anarchy (2008) also developed another similar mobile application by using flash-based. The same improvement was also obtained when the application is being evaluated.

Related to Business English which is used in the research, issues or problems that arise have been identified. Alameddine (2012) said that the problems in delivering English in Saudi are negative transfer, difference writing strategies, propositional knowledge, collocation patterns, and implications. These constraints are generally faced by some countries whose English pronunciation is quite difficult because of the national language or dialect used in that country.

In the recent period, the emphasis of the English usage in business circles is likely to increase. Thitthongkam et al. (2011) conducted interviews to 53 managers from various companies in Thailand. The result obtained is that foreign language skills help the business run more efficiently. It is also able to assist the company in expanding business to other countries and internationally.

Aside from the research that has been done, some mobile applications have also been developed. There are Vocab Study List, Learn English Podcast, and Test Your English Vocabulary.

- Vocab Study List

Vocab Study List is English vocabulary learning application on Android. There are two features in this app. The first one is feature that displays word and its definition. The second feature is quiz feature that is used to see user capabilities after the learning takes place. Disadvantage of this application is the absence of word categorization by its type and there is no way how to pronounce the word

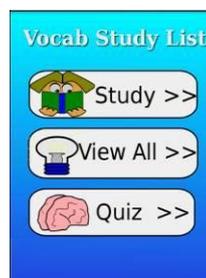


Figure 1. Vocab Study List

- Learn English Podcast

Learn English Podcast is an English learning application issued by the British Council. The learning method in this application is likely to train users to read and listen to a conversation of a group of people as well as between two people. To find out how far the user understands the conversation, user is able to access exercise feature that have some multiple choice questions. Disadvantage of this application is that the user must be connected to the Internet network to access the material users. In addition, the

exercise feature doesn't show the results summary, so it makes difficult to determine the capability level of learning outcomes.



Figure 2. Learn English Podcast

- **Test Your English Vocabulary**
Test Your English Vocabulary is an application devoted to learn vocabulary. It combines dictionary elements, testing elements and games elements in one application. Some of the features contained in this application are word by meaning quiz, meaning by word quiz, dictionary, searching feature for short words, mini games, result and listening test. Disadvantage of this application is the lack of visualization in form of image and sound in terms of learning.

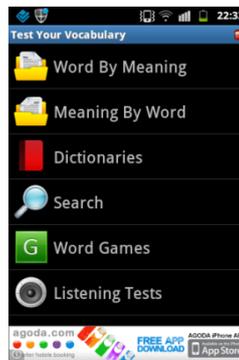


Figure 3. Test Your English Vocabulary

2.3 Methods Used

From the researches that have been mentioned before, we conduct a research which will have value-added rather than the previous works. The application focuses in making of the mobile learning application themed Business English in which the material consists of various types of word vocabulary with the addition of quiz features as well as voice recognition to help the users learn English. It also an aim to measure the user ability in doing the materials either it is before or after learning.

The method worked on the speech recognition is using the stages which are commonly used; they are feature extraction, speech pattern database, and pattern matching.

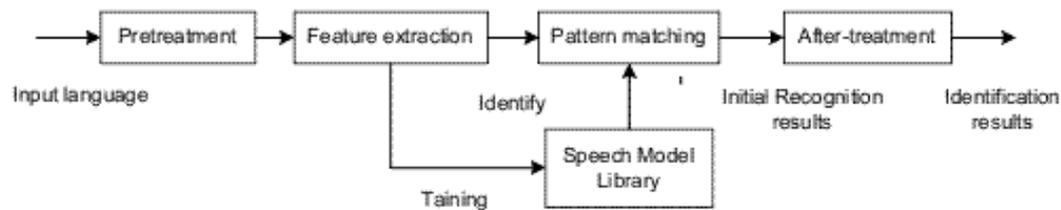


Figure 4. Voice Recognition Mechanism

Voice recognition method here is using Google Voice Search. The mechanism can be described as follows:

1. Enable Interface Recogniter_UI by pressing the voice recognition button by the user.
2. Users input sound through the microphone which is contained in the Android itself.
3. Voice that has been entered will be processed in the client site, and then it is converted from analog to digital signals.
4. The digital signal will be sent to cloud computing which is owned by Google to do the matching. It is called the search query.
5. The query results will be returned to user's smart phone

There are four main menus which are start, summary, games and help. The following workflow is as follows:

a. Start

When users access this menu, the option of learning categories will be given. After choosing one of the existing categories, for the first time use, user can only access the pretest. After finishing the pretest, user whose score is less than 8 can only access learning. But for user whose score is more than or equal to 8 may choose to access learning or directly take the posttest. When users access the learning, there will be a few words whose color is different from the other. This indicates that the word is a target of learning. Users can view detailed information of the word by selecting and clicking on it.

b. Summary

In this menu, user will be able to see the scores of the pretest or posttest that he has taken before. User can see the progression of his learning through this menu. Once completed, user can return back to the main page.

c. Games

In this menu, user can access questions for existing games. Once after completed, user can return to the main page.

d. Help

This menu is an additional menu that can be accessed as user assistance. If user has difficulty in accessing the menus, user can see the descriptions of each menu.

3. RESULTS

User can start to learn English by selecting steps to be taken. User can access pretest, learn, and posttest. First-time user can only access the pretest, whereas learn and posttest menu will be locked. Learn will be accessible after the user has been successfully run the pretest. While the posttest will be accessible when the user has been successfully answered the questions in the pretest with minimum score at least 8 or after the user has finished in accessing learn menu.

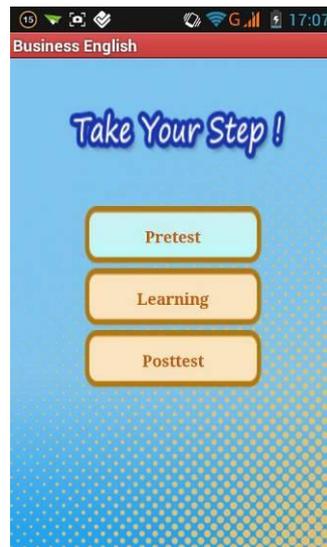


Figure 5. Home Page

Pretest and posttest are part of English learning methods contained in the application. The questions covered on pretest and posttest page are adopted from books and websites that support business English learning, such as Market Leader, Business Intelligence and bbc UK.

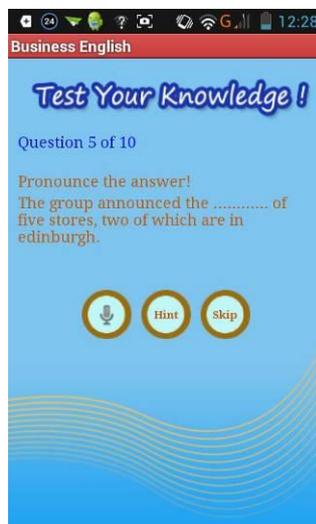


Figure 6. Voice Recognition Page

On the voice recognition problems, question will be presented and users have to answer the question by using their voice. User's voice then will be checked by using Google Voice Search. If the pronunciation is grammatically wrong, it will go to the next questions. After all the questions have been done, then user can check how to pronounce the word correctly by going to learn menu and listen how to pronounce that word.

At the end of the test, the user scores during their pretest and posttest will be shown . This score will be displayed on the score page.

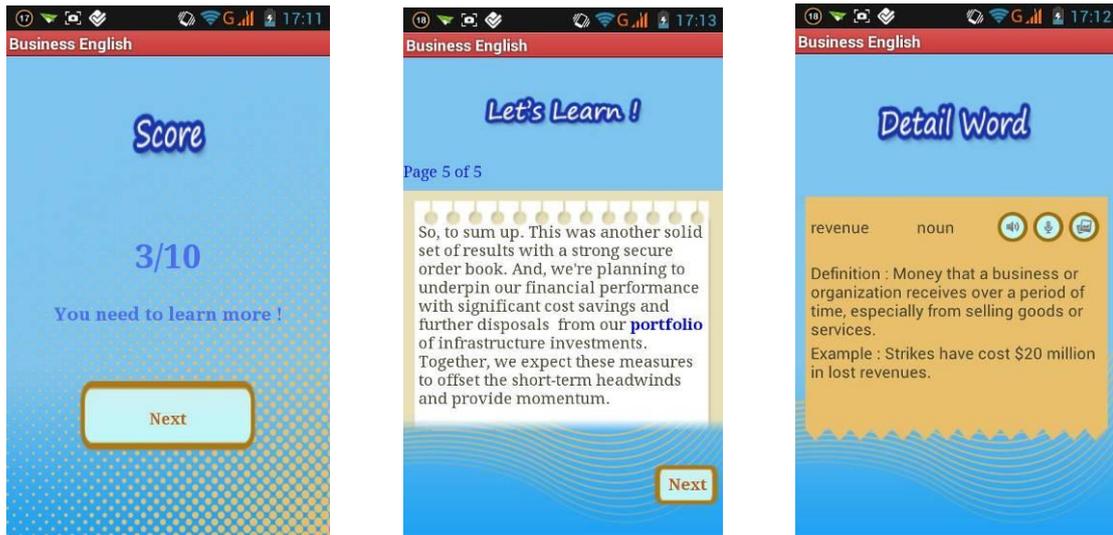


Figure 7. Score and Learn Page

Based on the results of questionnaires distributed to 35 respondents as an evaluation, several things can be concluded. This application is an application that is easy to use, with an attractive appearance as well as the help menu and other menus in it can help user to learn English. In addition, voice recognition feature on this application also help user to practice pronunciation. If comparison to the similar application is conducted as well, it can be found that the feature inside the Business English application is more complete than the others.

Table 1. Evaluation to Similar Application

Feature	<i>Vocab Study List</i>	<i>Learn English Podcast</i>	<i>Test Your English Vocabulary</i>	<i>Business English</i>
Visualization	No	No	No	Yes
Quiz	Yes	Yes	Yes	Yes
<i>Mini Games</i>	No	No	Yes	Yes
<i>Learning Summary</i>	Yes	No	Yes	Yes
<i>Pronunciation</i>	No	No	No	Yes
Word Categorization	No	No	No	Yes

Overall, this app is an interesting application that is able to increase user enthusiasm to learn English, more particularly Business English.

4. CONCLUSION

1. This app is an English learning application that provides excellence innovation content according to user requirements; they are listening, and speaking.
2. This application can improve the user's ability to learn Business English.
3. Voice recognition feature which is embedded inside the application allows users to practice the pronunciation of English words well and correctly.

REFERENCES

- Alameddine, M., M. (2012). *Teaching Business English for Arab Speakers*. American Academic & Scholarly Journal. 4(4). 65-70.
- Anarki, F., B. (2008). *A Flash Based Mobile Learning System For English as Second Language*. ABAC Journal. 28(3). 25-35.
- BBC. (2007). *Talking Business*. Accessed (10-08-12) dari <http://www.bbc.co.uk/worldservice/learningenglish/business/talkingbusiness/unit2meetings/1agenda.shtml>
- Bolton, K. (2008). *English in Asia, Asian Englishes and the Issue of Proficiency*. Accessed (07-29-12) dari <http://search.proquest.com/docview/205253493/abstract?accountid=31532>
- British Council. (n.d). *Learn English Professional English*. Accessed (11-04-12) from <http://www.britishcouncil.org/professionals-podcast-english-listening-downloads-archive.htm>
- Cotton, D., Falvey, D., & Kent, S., (2006). *New Edition Market Leader*. England : Pearson Education Limited.
- EF. (2011). *Indonesia Ranks 34 Out of 44 Countries in English*. Accessed (07-29-12) from <http://search.proquest.com/docview/862021525/13831698C4CB17087C/67?accountid=31532>
- Hughes, B. J., & Berry D. C. (2011). *Self-Directed Learning and the Millennial Athletic Training Student*. Athletic Training Education Journal. 6(1). 46-50.
- Intelligent Business. (n.d). *Review Test*. Accessed (11-15-12) from http://www.pearsonlongman.com/intelligent_business/review_tests.html
- Lauder, A. (2008). *The Status and Function of English in Indonesia: A review of key factors*. Makara, Sosial Humaniora. 12(1). 9-20.
- Longman. (n.d). *Longman Online Dictionary*. Accessed (11-19-12) from <http://www.ldoceonline.com/>
- Lu, M. (2008). *Effectiveness of Mobile Learning via Mobile Phone*. Journal of Computer Assisted Learning. 24. 515-525.
- McConatha, D., Praul, M., & Lynch, M. J. (2008). *Mobile Learning in Higher Education : An Empirical Assessment of A New Educational Tool*. 7(3). 2.
- Rore S.L. (2012), *Importance of English Language in the Globalization Era*. Accessed (20-04-13) dari <http://manado.tribunnews.com/2012/06/25/pentingnya-berbahasa-inggris-di-era-globalisasi>
- Tan, Z. H., & Lindberg B. (2008). *Automatic Speech Recognition on Mobile Devices and over Communication Networks*. United Kingdom : Springer.
- Tewari, A., Goyal, N., Chan, K., M., Yau, T., Canny, J., & Schroeder, U. (2010). *SPRING : Speech and Pronunciation Improvement through Games for Hispanic Children*. International Conference of Information and Communication Technologies and Development. 47.
- Zhang, Z. (2007). *Towards an Integrated Approach to Teaching Business English: A Chinese Experience*. English for Specific Purpose. 26(4). 399-410.