A Mobile Reader for Language Learners

Jemma König, Ian Witten and Shaoqun Wu

The University of Waikato, New Zealand

Abstract. This paper describes a new approach to mobile language learning; a mobile reader that aids learners in extending the breadth of their existing vocabulary knowledge. The FLAX Reader supports L2 (second language) learners in English by building a personalized learner model of receptive vocabulary acquisition. It provides dictionary lookup for words that they struggle with, tracks a learner's reading speed, and models their vocabulary acquisition, generating appropriate exercises to aid in a learner's personal language growth.

Keywords: Mobile language learning, implicit language learning, vocabulary acquisition, learner modelling

1 Introduction

There are thousands of language learning applications on the mobile market, as well as thousands of web-based language learning systems that can be used on mobile devices. These applications focus on explicit learning through intensive reading, which has been successful in initially learning a second language but may have less importance when extending a learner's vocabulary to a more advanced level.

The FLAX Reader supports L2 (second language) learners in English that are interested in extending the breadth of their vocabulary. Where majority of mobile language learning applications focus on introducing a new language, the FLAX Reader focuses on building existing language knowledge. The Reader takes advantage of implicit, incidental learning, exposing the learner to articles of various length, and building a learner model of receptive vocabulary acquisition that is unique to each language learner. The Reader allows learners to extend their vocabulary without the use of intensive reading or explicit learning goals.

2 Literature Review

"Implicit learning" is the process of acquiring knowledge without conscious intention. Sternberg (1999) describes implicit learning as "the process whereby knowledge is acquired largely independently of awareness of both the process and the products of acquisition". In contrast, "explicit learning" is the process of acquiring knowledge with conscious intent. Explicit learning includes structure: clear outlines, learning goals, and unambiguous explanations. The FLAX Reader takes advantage of implicit learning, providing L2 learners with reading material and dictionary lookup, extending their vocabulary knowledge without conscious intention.

"Intensive reading" focuses on small sections of difficult text, addressing the language itself rather than the text, and is the reading technique that is used primarily in second language learning, particularly when an L2 learner is first starting out. In contrast, Nation (2001) advocates "extensive reading", where 95%-98% of words are familiar, leading towards extensive reading being used to increase reading fluency and to build language knowledge, rather than for introducing a new language. The FLAX Reader uses extensive reading to build L2 learners' vocabulary knowledge.

"Learner modelling" refers to the generation of a learner model, where the model is created based on the interactions between the L2 learner and the language learning system (Walmsley, 2015). iCALL (Intelligent Computer Aided Language Learning) uses learner modelling to adapt in order to suit the users learning experience. Researchers have investigated using iCALL in language learning and tutoring systems; for grammatical practice and error detection (Amaral and Meurers, 2011; Heift, 2001, 2012). Unfortunately, prior research into learner modelling of extensive reader systems is rather limited. The FLAX Reader uses learner model-

ling to model an L2 learner's receptive vocabulary acquisition. The model changes based on assumptions that a learner does or does not know a word (I.e. does or does not click on a word).

3 Existing Applications

There are a large number of language learning applications available in the mobile market but they all tend to focus on intensive reading and explicit language learning. Mobile applications that use extensive reading (I.e. E-Readers) may provide dictionary look-up, but they do not include further language learning features, such as learner modelling for personalized vocabulary growth.

4 The FLAX Reader

The FLAX (Flexible language acquisition) Reader is a mobile-based reader that tracks a learner's reading speed and builds a model of receptive vocabulary acquisition. It was developed as a tool to aid in language learning, and generates exercises based on areas of the English language where the learner has been shown to struggle. The primary contributions of this work are:

1. Providing reading material, using extensive reading to extend the breadth of an L2 learner's vocabulary.
2. Providing dictionary look-up, allowing a learner to extend the breadth of their vocabulary each time they encounter a word that they are unfamiliar with.
3. Modelling vocabulary acquisition, building a personalized learner model, including the degree of the learner's confidence in the meaning of each word.
4. Tracking a learner's reading speed, using the lowest WPM to generate language learning exercises.

The FLAX Reader retrieves a collection of articles from the existing FLAX server for learners to use as extensive reading material. Twenty articles are currently retrieved from the FLAX server, however the Reader has been implemented in a way that allows it to be extended to include any reading material found on the server, from beginner, intermediate, and advanced reading levels.

By interacting with an external dictionary application, the FLAX Reader helps with receptive vocabulary acquisition, providing the learner with dictionary look-up. This allows a learner to extend the breadth of their vocabulary each time they encounter a word that they are unfamiliar with. The dictionary application that the Reader interacts with is Livio English Dictionary. The definitions are based on Wiktionary and are all built into the Livio application so network connectivity is not required.

Learner modelling allows the FLAX Reader to build a personalized vocabulary model for each learner. The learner model holds a list of entries which represent each word that the L2 learner has encountered in the articles to date. Each entry in the learner model is made up of a key-value pair, where the key is the base word and the value is the degree of confidence with which the learner knows that word. We cannot assume, simply from clicking a word, that the user is entirely unfamiliar with its meaning. Giving each word a *degree of confidence,* allows us to account for accidental clicking and individual response styles. The degree of confidence is a value between 0 and 1 which represents the probability that the L2 learner is familiar with a word, with 0 having 0% probability that the learner is familiar with the word, and 1 having 100% probability that the learner is familiar with the word. When an L2 learner reads an article, every word that they do or do not click contributes to the learner model, with the degree of confidence increasing or decreasing relatively. As a learner reads each article, the learner model develops and grows to include every word that they have encountered, with words that they struggle with percolating up to the top of the list, where their degree of confidence is lower than words that the learner is comfortable with. These low confidence words can be used to generate language learning exercises, reinforcing the relevant vocabulary.

The FLAX Reader tracks a learner's reading speed in order to generate language learning exercises that suit their reading ability. The time taken to read a page is used to generate WPM (words per minute), where the WPM are considered valid if and only if they fall into a given threshold. Any outliers are excluded, assuming the learner either skimmed the article too quickly to have genuinely read it, or was distracted and left the article open too long. This data is used to generate personalized language learning exercises that are tailored to each individual learner's abilities. The Reader keeps track of the page in each article that had the

lowest WPM, assuming the page with the lowest WPM is a page that the learner struggled with. The Reader can then generate an exercise to reinforce the vocabulary that was seen on that page.

Language learning activities are a way to further cement the process of learning a second language. The FLAX Reader utilizes three existing FLAX mobile-based language learning applications: Hangman, Split Sentences and Scrambled Paragraphs. As an example of one of the three activities, Hangman is a language learning activity that helps L2 learners with receptive vocabulary acquisition. Each exercise has one hidden word represented by a row of dashes. The learner has to guess this hidden word by guessing the individual letters. The FLAX Reader uses the learner model to choose the words in the current article that have the lowest degree of confidence (i.e. the words that the learner is least familiar with) in order to generate exercises for the Hangman application.

5   Usability Study

A usability study was conducted on the FLAX Reader to evaluate the applications functionality and ease of use. The study was in the form of an interview, where each participant was asked to complete four tasks (saving an article, deleting an article, reading an article, and playing a language learning activity), and was interviewed at the completion of each task. Participants were asked a total of 24 interview questions: 3 relating to saving an article; 3 relating to deleting an article; 9 relating to reading an article; 4 relating to playing a language learning activity; and 5 that related to the usability of the FLAX Reader in general. The aim of the usability study was to determine whether the design and functionality decisions that had been made were supported, and to outline any additional issues that may not have been previously identified.

The user study showed three main areas that stood out as problematic: the process of saving or deleting an article; the position and emphasis of the play button; and the article content itself. UI changes have been made to the application since the completing of this study in order to correct these issues. Overall, the final results of the study were positive, with the majority (80%) of participants saying that they would use the FLAX reader to aid in their language learning. 50% of participants thought the ability to provide dictionary look-up was one of the main positive features and 30% of participants thought interacting with language learning applications was one of the main positive features.

6   Conclusion

The FLAX Reader is a mobile-based extensive reading application that helps with language learning. It uses learner modelling to build a personalized model of receptive vocabulary acquisition, generating language exercises to aid in learning English as a second language.

The development of software is never finished. There is always more that can be done: further research, additional features, the refinement of current features. The FLAX Reader has simply scraped the surface of mobile based, implicit language learning, using learner modelling to create a basic model for vocabulary acquisition. The progress made in this project raises the possibility of monitoring the acquisition of vocabulary at an even more fine-grained level of detail; a precise, timed, history of encounters with every individual word.

7   References

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