Web-Based Asynchronous Dictionary for Supporting EFL Learning

Pao-Yao Huang, Aaron Robert Fischer, and Shuchih Ernest Chang

***Abstract*—This paper explores a new method and system for English as a Foreign Language (EFL) learners to conveniently look up, via one request, tens (or even hundreds) of words identified and specified in e-texts, and our experiment results show that when compared with other types of dictionary use, this new method is more valuable and more efficient. What this new method can do for EFL learners is to make the task of looking up words simpler and more effective. In our project, additional features including vocabulary list and RSS feed content are implemented in the system to support mobile devices and enhance learning results.**

***Index Terms*—Web 2.0, e-commerce, m-learning, web-feed, EFL, asynchronous learning.**

I. Introduction

Dictionaries are important tools for foreign language learners in text comprehension and vocabulary building, but they are limited in one important way – how learners find words in them. This drawback is shared by most dictionaries in use today. Foreign language learners are aware that extensive reading in their target language is an effective way of increasing vocabulary [1], but this requires a large investment of time. It has even been demonstrated that dictionaries can help readers retain words found in conversation or other learning materials [2], but readers often fail to learn the proper meaning of new words for a great many reasons. Among these reasons are several which include the inconvenience of using a dictionary, especially when lengthy texts are involved. These inconveniences can even lead to the failure to use the dictionary at all. It is found that 80% of EFL (English as a Foreign Language) students reading English fail to lookup all new vocabulary and 93% attempt to guess the meaning of new words [3]. For those who do use a dictionary when reading, it has been clearly demonstrated that such behavior increases recollection of new words in text [2]. As such, it is important to maximize dictionary use among EFL learners and this can be achieved by rethinking the way words are looked up in a dictionary. A new method for EFL learners to look up, efficiently via one Internet request, tens (or even hundreds) of words specified and highlighted in e-texts is proposed and experimented in our study, and our experiment results show that EFL learners feel that this proposed method is very simple and effective, thus considered as a valuable EFL learning tool.

Manuscript received March 13, 2012; revised May 5, 2012.

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II. Research Background

The drawback with dictionaries is the time invested in searching for each individual word. Time is wasted in repetitive actions such as stopping, flipping pages, searching for the right entry, and finally determining the correct translation in light of the context. While doing this, readers may have already lost valuable time and their rhythm [1]. Another drawback is that dictionaries do not get updates. Words are added to the English language every year. Add to that the physical aspect – that is, that dictionaries take up space and add weight, and the drawbacks of paper dictionaries become even more apparent.

A learner's alternative to a paper dictionary might be an electronic dictionary whose advantages are numerous, including compactness and multiple methods for looking up words. With an electronic dictionary, learners can search for words simply by typing them on a small keyboard and immediately get the results. In addition, the learner may have access to an audio sample instead of pronunciation symbol. This offers excellent time savings to the learner over a paper dictionary [4], but is actually a double-edged sword in that it results in "shallow processing" – the information fails to consolidate [5]. Another drawback is that electronic dictionaries cannot easily and frequently get updates, just like paper dictionaries.

The next alternative developed was the web-based dictionary which offers the advantage that it is located on a server at a different location. Learners do not need to carry a dictionary with them as long as they have access to the web. This has become more and more relevant in recent years as computing becomes more pervasive and ubiquitous. Now computers are getting smaller and wireless communication is becoming more and more common. As such, the web-based dictionary, which is updated regularly, is always available to web users. Though quite an improvement over the above alternatives, a web-based dictionary is not without its drawbacks. Words must be entered by hand on a keyboard, one-at-a-time, and the response time, depending upon connection speed, may not be as quick as an electronic dictionary. Meanwhile, as the user waits for a response for each entry, useful time is wasted.

The latest additions to dictionary-type services include Google Translate and built-in browser dictionaries, which offer some benefits to users but are bound by some limitations. The primary weakness of Google Translate is that users are given a generic translation, and cannot choose the best translation. If a user chooses to translate a document or

paragraph, it might be rendered practically unreadable after translation, as demonstrated by Chang and Tung [6]. Dictionaries built into browsers are useful tools for a user who would otherwise not use a dictionary, but are limited in that users cannot cut and paste from them – users cannot easily keep a list of words and definitions for later reference, unless written down by hand.

Prior literature has demonstrated the scenario of dictionary use in language learning, but to date has not yet demonstrated a dictionary with the advantage of our proposed system. All of them, whether monolingual or bilingual, rely upon the user to repeat the task of looking up individual words. This leads us to the need for research on possible new methods for learners to look up words, which is the topic of this paper.

III. The Web-Based Asynchronous Dictionary System and Service

A. Design Objective

While all aforementioned dictionaries offer advantages of some sort, our research project had a goal to not only account for most drawbacks of the above methods for looking up words but come up with a solution, the web-based asynchronous dictionary service. In this system, the user highlights many problem words in a document, submits the document to the dictionary service, and then receives the word definitions annotated in the originally submitted content. In addition, the user can request extra information, such as English examples and a pronunciation file in the form of a ".wav" file, all of which is brought together in a hypertext document presented in one browser window. What this all means is that the learners can use their time more productively – learning the target language instead of searching for words one at a time. This system addresses the drawbacks of other methods. If users need to look up a large number of words, this system offers greater efficiency. A more detailed explanation of how the system functions is outlined as follows.

B. Usage Scenario

In order to benefit from this system, users must go through a series of steps. For some users, it may be challenging, so we have posted a tutorial on the introductory page of the system. Here even the most inexperienced users can follow a series of screenshots to finish each step.

The first step is that the users have to navigate to our service site, open up their document and then highlight their target vocabulary words throughout the document in three colors: red, yellow, and lime (see Fig. 1). If the users wish to obtain the Mandarin definition of the word, they must use red. To obtain the Mandarin definition along with a pronunciation audio file, they must choose yellow. Finally, they should highlight the word in lime if they wish to obtain the Mandarin definition, audio file, and English sentence examples. Afterwards, users can then submit the highlighted document to our server. The response time may take minutes for users, and after that users can view the results in two forms: an RSS feed or a webpage. The webpage is similar to the document submitted by the user, and selected words are shown in blue text on the webpage (see the right part of Fig. 1). Once the user has placed the cursor on one of said words, a gloss pops up, appearing with the Mandarin definition together with desired optional output. The user can easily read and study the annotated content of original document without referring to a dictionary.

Fig. 1. An marked input document (on the left) and its corresponding annotated output document (on the right).

If the user chooses to access the RSS feed, the result is a list of the selected words, each followed by the requested information (see Fig. 2). Here the user can practice their vocabulary words before or after reading the original document. Once finished, users can keep revisiting their document online and refer to their vocabulary lists, which they can choose to accumulate into a master list for vocabulary building (see Fig. 2).

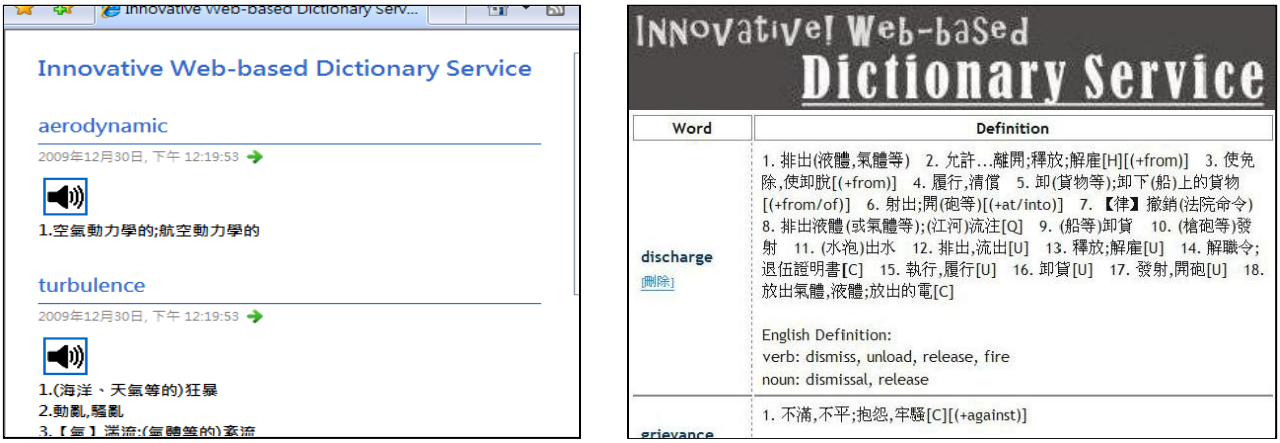

Fig. 2. RSS feed result (on the left) and user's vocabulary list (on the right).

C. Implementation

Behind the scenes, there are several Web 1.0 and Web 2.0 concepts at work that make this asynchronous dictionary service possible. Among them are web-feeds, screen scraping, mashups, and web application paradigm [6]. The convenience of web-feed is that they allow users to simply subscribe and the content is pushed to them when it becomes available, thus sparing the user the hassle of checking for content [6, 7]. Screen scraping technique was used by our service to extract highlighted words. There is no dictionary database in the asynchronous dictionary system; instead, it uses mashup technique to assemble the required dictionary contents obtained from other dictionary service websites on the Internet. The users can access their desired vocabulary information they sought in one neat, concise webpage or RSS feed. An object-oriented and scenario-based modelling approach, as described by Chang and Tung [6], was adopted in our project to implement the web-based asynchronous dictionary system.

IV. The User Study and Results

The objective of our user study is to test just how useful our web-based asynchronous dictionary system is to EFL learners, and to find if it is truly unique when compared with other types of dictionary use. To achieve this, we asked the users if this new method helped them learn new English words, saved them time and effort, if it is unique, and if it is an improvement over other types of method for looking up words.

Our asynchronous dictionary system was deployed and introduced to 23 university students. Among them, 9 were male, and 14 were female. Their ages ranged from 18 to 39 years old, with the majority ranging from 23 to 29 (86.9%). As for the educational background, 11 informants (47.8%) had or were pursuing postgraduate degrees, and 12 (52.2%) were college students or had bachelor degrees. After following the on-screen directions and using the system to assist in reading a chosen article, the users responded to an online questionnaire survey which contains three parts: demographic information, learning value of the system, and user feedback. We attempted to determine the learning value of the proposed web-based asynchronous dictionary system based on user opinions of vocabulary learning, ease of learning, efficiency, effort, and time. We also elicited user opinions on the uniqueness of the system and the improvement that the system provides over other types of dictionary use. Table 1 shows the results derived from this part of survey

TABLE I: User Opinions on Asynchronous Dictionary Service

Survey questions on dictionary service (the value of the dictionary service and system) (1: Strongly disagree, 2: Disagree, 3: Neutral, 4: Agree, 5:Strongly Agree)	**Mean**	**S.D.**
1. The words I learned with the asynchronous dictionary service may help increase my vocabulary.	3.91	0.79
2. With the help of the asynchronous dictionary service I learned new words easily.	4.14	0.62
3. I found learning new words with the asynchronous dictionary service to be very efficient.	4.39	0.65
4. The asynchronous dictionary service reduced the effort required to read the article.	4.34	0.66
5. The asynchronous dictionary service reduced the time I needed to read the article.	4.21	0.90
6. The asynchronous dictionary service provides a different way of looking up words.	4.00	1.12
7. The asynchronous dictionary service provides a major improvement over other types of way for looking up words.	3.91	0.79

The first item had a relatively high score indicating that the users agreed that use of the system may have a positive effect on vocabulary growth (Mean = 3.91). The use of any dictionary would share this same effect, but our study indicates that this is also true for our new way of looking up words. The users found that use of the system provided a method to learn new words easily, as indicated by the second item (Mean = 4.14). This shows that the asynchronous dictionary service can indeed be used as a tool to learn new words, helping learners acquire fluency in a foreign language. In the third item, we attempted to determine the efficiency of the system. Users found this new way of looking up words to be quite efficient (Mean = 4.39). As expected, the results indicate that use of this system is efficient, possibly more so than other types of dictionary use. In the fourth item, we asked the users about the effort required to read the article. Here the users found the system to be effective in reducing effort (Mean = 4.34). Thusly, the learner's efforts can be focused on less tedious tasks and more on learning the material, allowing them to convert dead time into useful time. In terms of time, users found this system to be a time-saver

when reading an article (Mean = 4.21). Instead of flipping the pages of a dictionary, or typingaway to look up words, the users only needed to highlight problem words to be looked up automatically, granting them a time savings benefit.

To determine the uniqueness of this system compared with other types of dictionaries, we asked the users if they agree that use of this system is different from other types of dictionary use. The results indicate that they did agree with this statement (Mean = 4.00), so we argue that this is indeed a different way of looking up words. The final question was to determine if the users felt that this was an improvement over other types of way for looking up words. The results indicate that the users felt it was an improvement (Mean = 3.91). As indicated by aforementioned findings, the users felt that the system was useful for increasing vocabulary, ease-of-learning, improving efficiency, decreasing effort, and reducing time. It follows that the users would feel that it is both different and an improvement over regular dictionary use.

In addition to evaluating the system as it is today, we also asked the users to opine on some possible future functions. As shown in Table 2, the users overwhelmingly responded that accumulated word list to be a useful function; not a single user rejected this idea. When considering users sharing their accumulated word lists, 70% of respondents responded positively. Here, users studying similar fields could benefit from one another's previously searched vocabulary. Users also liked the idea (91%) of inviting others to share their uploaded documents. Users could collaborate and share work this way; once uploaded, it would save the others the task of finding and highlighting words. We then asked the users if it would be useful to be able to add comments on their friend's uploaded documents, to which 83% responded "yes". We also asked the users if they would keep using the service if it were available, and they unanimously responded positively.

TABLE II: USER OPINIONS ON POSSIBLE FUNCTIONS (PART 1 - YES/NO QUESTIONS)

User Feedback	**Yes** (%)	**No** (%)
1. It would be useful to keep all of my vocabulary words compiled in a list	100	0
2. Do you think it would be useful if users could share their vocabulary lists with one another?	70	30
3. Do you think that it would be more useful to be able to invite others to share your uploaded documents?	91	9
4. Do you think that it would be more useful to be able to write comments on your friend's uploaded documents	83	17
5. Would you keep using the asynchronous dictionary service if it is available?	100	0

TABLE III: USER OPINION ON POSSIBLE FUNCTIONS (PART 2 - MULTIPLE CHOICES)

User feedback – Responses to #6, Possible Functions	**Quantity**	**%**
Comments/Discussion	10	43
Auto-archiving of new words (personal list)	20	87
Word sharing (vocabulary lists)	7	30
E-mail word-of-the-day	6	26
Flashcards	15	65

Finally, we asked the users to choose from a list of functions that they would like to see in future versions of the system. As shown in Table 3, the most popular function (87%) that the users chose was auto-archiving of their highlighted words. The next most popular item (65%) was to provide online flash cards. Some of the items were not so popular among the users. Comments (43%), vocabulary list sharing (30%), and finally word-of-the-day (26%) were all rejected by more than half of all respondents. More study is necessary to determine the true usefulness of these functions in language learning.

V. CONCLUSION AND RECOMMENDATION

Users found the system to be quite useful and made their reading tasks easier in terms of time and effort, and found it easier to use than other types of dictionary. Clearly, the users indicated that use of the service helped to increase vocabulary, and did so easily and effectively. Users also found it to be a time-saver and reduced their effort in looking up words. Naturally, if the service can provide a time savings and reduction in effort for users, they would find this method to be an overall improvement compared with other types of dictionary use, and that is exactly what we found: users felt this new method provides a major improvement over other types of method for looking up words.

More possible research could focus on actual time saved by using this new method. A similar study was conducted comparing a hyper-reference and conventional dictionary. The hyper-reference is defined as "an online electric aid that provides immediate access to adjunct information with a direct-return path to the target information" [8]. In that study, users with access to paper dictionaries were compared with groups who had access to the hyper-reference. The results showed that consultations, study time, and efficiency were all much better for the experimental group, while comprehension was nearly equal for both groups.

Our proposed method of looking up many words in one request is indeed unique, as indicated by the users. Actually, there exists no other system that can provide many annotated definitions (together with sample sentences and pronunciation audios) with a single user request for saving users' time and effort. The one truly unique characteristic of this method is that the words are looked up all at once rather than one at a time. This can allow users to scan the document for possible trouble words before reading it, or to read the document and highlights new words as they go along. Future research could be conducted to find how users prefer to use the system. This might depend on their overall goal – to build vocabulary or comprehension. If a user prefers to save time, they might simply scan the document one time to find new words, and find their definitions before reading. Those dedicated to learning vocabulary and best possible text comprehension could read the article while highlighting words, and then read the article a second time.

Though some of the potential future functions we proposed were rejected by the users, they may not be aware of the learning value which they possess. Activities associated with new words help consolidate them into permanent memory [5]. Of course, the users liked the idea of having all their new vocabulary words stored in one place,

which would allow them to review vocabulary anytime. This would also save them the trouble of writing it down by hand or copying and pasting. Access to online flashcards was a function that some of the users went for. It has been demonstrated that flash cards are a common and useful tool in building vocabulary [3, 9]. For example, while waiting for a request to be processed, users could even convert that time into useful time by quickly flipping through their flash cards in a browser.

The functions and activities provided by the system should help users to learn the target language, as demonstrated by Laufer [10, 11]. One of the studies demonstrated that users who wrote sentences with words that they had looked up recalled new vocabulary with much greater success than those who simply looked up the word [10]. As such, we suggest that the next version of the system and its corresponding survey explore a sentence writing task of some kind to enhance the learning value.

As of yet, there are no methods for looking up words without some kind of deficiency involved. Our system has various features to offset these deficiencies. Users can keep an archive of their words and study them whenever users deem appropriate. In future versions, flashcards and other functions may be added to the system so the learners can benefit more. This paper merely presents the preliminary study results on the web-based asynchronous dictionary service, and further technical enhancements to the system and their corresponding in-depth user studies and analyses are subject to our future investigations.

ACKNOWLEDGEMENTS

This work was supported by the National Science Council, Taiwan, under contract numbers NSC-99-2221-E-005-058-MY3 and NSC-98-2221-E-005-022.

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