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An e-portfolio to enhance sustainable vocabulary learning in English

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Abstract

Vocabulary is an area that requires foreign language learners to work independently and continuously both in and out of class. In the Japanese EFL setting, for example, more than 97% of the population experiences approximately six years of English education at secondary school during which time they are required to learn approximately 3,000 words (i.e., lemmas). Given the lexical distance between Japanese and English, this leaves Japanese university EFL learners with a long way to go before they can acquire a sufficient number of words to comprehend authentic texts in English. To help Japanese university EFL learners sustain their vocabulary learning, the researchers have developed *Lexinote*, an e-portfolio system that allows learners to record and save the target words they encounter online, to search for them in online dictionaries, to practice them in several ways including written and oral rehearsals according to word familiarity (i.e., level of understanding of each lexical item), and to share their own output with peers. Learners are guided to monitor and control their vocabulary learning metacognitively according to word familiarity. *Lexinote* also provides learners with multimedia materials such as audio lessons for business and academic vocabulary development and online video lectures to prepare for classes conducted in English. Instructors can monitor students' learning records by number of words recorded, by type of practices chosen, and by how frequently they edit their learning records. This paper introduces the key concepts and basic functions of *Lexinote* and discusses how it can benefit learners, instructors, CALL researchers and developers with results from a survey on learners' perceptions.

Keywords: Vocabulary learning; e-portfolio; vocabulary learning strategies.

1. Introduction

Vocabulary is central to language and is of critical importance to the typical language learner (Zimmerman, 1997); however, for many learners, especially in a foreign language setting, vocabulary learning is a long and arduous process. For unassisted comprehension, learners need to recognize enough vocabulary to cover 98% of text: 8,000-9,000 word-families for written text and 6,000-7,000 word-families for spoken

text (Nation, 2006). This usually means that foreign language learners are required to work independently and continuously out of class to acquire sufficient vocabulary. In Japan, learners are required to learn approximately 3,000 words (i.e., lemmas) during their secondary education (MEXT, 2009). Therefore, learners who continue to study English at a tertiary level still need to learn an enormous number of words, even after six years of English study. Besides the challenge of the quantity of words, or width of vocabulary, learners need to know various aspects of words, or depth of vocabulary, in order to be able to use the language effectively. English class hours for Japanese university students are not usually adequate to cover this learning burden, leaving learners in need of assistance with their sustainable vocabulary learning.

The teaching and learning of vocabulary learning strategies (VLS) can play a significant role in solving such problems in foreign language vocabulary learning. VLS research has reported on the effects of particular strategies or combinations of strategies (Brown & Perry, 1991; Ellis & Beaton, 1993), on the effect of metacognitive strategy instruction (Mizumoto & Takeuchi, 2009; Rasekh & Ranjbar, 2003), and on proposals for VLS instruction (Fowle, 2002; Schmitt & Schmitt, 1995). On the other hand, it has been found that learner use of VLS changes over time depending on their development in the target language (Schmitt, 1997); thus, an effective strategy for one particular learner is not always effective for others. The difficulty in identifying an effective combination of strategies has also been questioned (Sawyer & Ranta, 2001). However, one promising line of research is in the use of metacognitive strategies, the monitoring and controlling of other cognitive strategies (Gu & Johnson, 1996; Mizumoto & Takeuchi, 2009; Rasekh & Ranjbar, 2003). It can be inferred that learners should be trained to monitor and control various VLS metacognitively according to their general level of proficiency and their level of understanding of each word.

To tackle the issue of sustainable vocabulary learning, the researchers developed *Lexinote*, a web-based e-portfolio that enhances the metacognitive use of VLS and promotes independent and continuous learning. This paper will describe its basic functions and, based on the results of a survey of learners' perceptions about using the system, will discuss how it can benefit learners, instructors, CALL researchers and developers.

2. Development of *Lexinote*, an e-portfolio for sustainable vocabulary learning

This section describes *Lexinote*, its relationship to vocabulary learning strategies, its dictionary data, and how it can be used for self-study and class assignments.

2.1. What is Lexinote?

Lexinote is a web-based e-portfolio that helps language learners visualize their vocabulary knowledge so that they can monitor and control their own learning processes and products. *Lexinote* can be used not only by learners as a self-study tool but also by instructors as a way to feed assignments in class. After coming across a new word, learners typically use *Lexinote* to search for a word in an online dictionary and record its information: meanings in L1, definition in the target language, example sentence, related words (e.g., synonyms, antonyms, collocations), and their own sentence containing the target word. Later, as their understanding of each lexical item grows, learners edit this information and continue to rehearse the word until it becomes knowledge at their disposal. We will further describe how learners can use *Lexinote* for self-study and class assignments later in this section.

Lexinote uses the notion of word familiarity as an indicator of learners' understanding of each lexical item. Although vocabulary knowledge is sometimes conveniently dichotomized into two categories —receptive and productive— for educational or research purposes, the boundary between the two categories is vague, and Melka

(1997) suggests that the distinction be avoided or even abandoned. Using the term *familiarity*, she also insists on the need to recognize different levels or a continuum of vocabulary knowledge. Similar attempts to capture learners' vocabulary knowledge have been done by other researchers. Hatch and Brown (1995) proposed five levels of word familiarity from 1 "encountering new words" to 5 "using the words". Paribakht and Wesche (1996) developed the Vocabulary Knowledge Scale (VKS) to assess language learners' vocabulary knowledge from 1 "I don't remember having seen this word before" to 5 "I can use this word in a sentence." These proposals imply the importance of seeing learners' vocabulary knowledge as a gradually and continuously developing continuum rather than a dichotomous shifting from receptive to productive state. Following these examples, *Lexinote* employs five levels of word familiarity: 1. I have seen this word, 2. I know its form and sound, 3. I can recall the word from its L1 equivalent, 4. I can recall the word when I see it in an example sentence, 5. I can make my own sentence with the word. Learners are required to choose the appropriate level of word familiarity each time they register a target word and edit its information in the system so that they become aware of their state of knowledge. Hence, learners are expected to metacognitively monitor and control their own vocabulary learning through the concept of word familiarity. Learners can adjust the word familiarity manually themselves or have the system automatically adjust it according to the type of rehearsal completed. During the actual learning process, it could be the case that a learner at first develops their knowledge of a word linearly, but cannot maintain the same knowledge state or even returns to an earlier state. It could also happen that a learner can recall a word used in a sentence (Familiarity 4), but cannot recall its L1 equivalent (Familiarity 3). *Lexinote* thus uses the notion of word familiarity to idealize the process of vocabulary knowledge development, enabling learners to better monitor and control their own vocabulary learning.

2.2. Vocabulary learning strategies and Lexinote

The monitoring of vocabulary knowledge based on word familiarity is one form of metacognitive vocabulary learning strategy use; however, *Lexinote* also targets other cognitive VLS that can be metacognitively controlled by learners. Schmitt (1997) proposed two types of VLS: discovery strategies and consolidation strategies. A discovery strategy is one that learners use when they try to identify the meaning of a word, such as guessing the meaning from context or looking a word up in the dictionary. *Lexinote* targets seven types of consolidation strategies: oral rehearsal, written rehearsal, note-taking, reference, organization, language exposure, and metacognitive control. Table 1 shows the relationship between each VLS and the related *Lexinote* learning activities.

VLS	Description of VLS	Learning activity on <i>Lexinote</i>
Oral Rehearsal	Recalling or reading out loud phonetic aspects of a word, mapping meanings on its sound form, repeating a word	Rehearsal 1: recalling meanings from the sound of a word (Yes /No) Rehearsal 2: recalling and typing a word from its sound (also <i>written rehearsal</i>)
Written Rehearsal	Recalling or writing of orthographic aspects of a word, mapping meanings on its written form, repeated writing of a word	Rehearsal 2: recalling and typing a word from its sound (also <i>oral rehearsal</i>) Rehearsal 3: recalling and typing a word from the L1 equivalent
Note-Taking	Recording and using information about a word (e.g. related words,	Recording and revising word information in the item window

	definitions)	Using spreadsheet output
Reference	Reinforcing knowledge by the use of a dictionary	Referring to online references (e.g., English-Japanese dictionary, thesaurus, learners' dictionary)
Organization	Networking words by relating known words to unknown words, grouping words together, comparing similar words	Recording related words (e.g., collocations, synonyms, antonyms) in the item window. Referring to other users' information or related words (e.g., collocations, synonyms, antonyms)
Language Exposure	Securing opportunities to be exposed to and to use the word in context	Making a sentence with the target word and saving as self-expression Sharing learning outcomes such as self-expressions Posting comments on assignments or to peers' posts
Metacognitive Control	Monitoring, controlling of learning, self-initiating of a word	Setting, adjusting, monitoring of word familiarity Choosing words to be rehearsed

Table 1. Vocabulary learning strategies and related learning activities on Lexinote.

2.3. Dictionary data

It is suggested that there are 114,000 word-families in English and that well-educated native adult speakers of English know around 20,000 word-families on average (Goulden, Nation & Read, 1990). However as we have seen in the previous section, the goal of foreign language learners would be 8,000 to 9,000 word-families in order to be able to read authentic text. In developing the dictionary data for *Lexinote*, the researchers used the Corpus of Contemporary American English (COCA) 20,000 word frequency list (Davies, 2008) as a base list. COCA is the largest freely-available corpus of English, and the only large and balanced corpus of American English (Davies, 2008). Then the base list was compared with other available wordlists for Japanese English learners: Hokkaido University Vocabulary List (HUVL) (Sonoda, 1996), JACET 8,000 (Committee of Revising the JACET Basic Words, 2003) and SVL 12,000 (ALC, 2009). All the wordlists were merged to generate a total of 18,515 headwords as the final wordlist for *Lexinote*. Then the headwords were put into levels from 1 to 6 according to the HUVL (Sonoda, 1996): 1 junior high school mandatory level (786 words), 2 senior high school mandatory level (1,778 words), 3 university entrance examination level (2,096 words), 4 university basic level (1,520 words), 5 university advanced level (1,274 words), and 6 (not in HUVL). These HUVL levels were used so that Japanese EFL learners would be able to recognize the educational level at which they would be expected to learn each word. In addition, based on Coxhead (2000) and Chujo (2003), the researchers chose 942 academic and/or basic business words from this list for learners at their institution to learn, producing the Hokkai-Gakuen Humanities Word List 942 (HWL942).

2.4. Self-study with Lexinote

In order to assist learners' self-study in vocabulary, *Lexinote* employs a "self-study note" (Figure 1). In the self-study note, learners copy whatever text they want to learn from the Internet and paste it into the note section to check. If a word is already registered or has been used by the learner, it is shown in green for HWL words and in blue for other words. If a word has not been learned, it is shown in yellow for HWL


words and in red for other words. If a word is not in the *Lexinote* dictionary, it is shown in pale blue when it is a learned word and in grey when not learned.

When a learner finds a word he/she wants to learn, he/she clicks it and the word will appear on the left side of the notebook (Figure 2). If a word is registered in the *Lexinote* dictionary, L1 (Japanese) equivalents will automatically appear. If the learner wants more information about the target word, he/she can use one of the four online dictionary link buttons above the notebook space to open a new window in the Internet browser; the dictionaries are a comprehensive English-Japanese dictionary (Weblio), a thesaurus (Thesaurus.com), a monolingual English learner dictionary (Longman Dictionary of Contemporary English) and an English-Japanese and Japanese-English dictionary (Eijiro). After confirming or inputting in the "meaning" section, the learner can choose whether he/she wants to register the word or to continue recording other fields such as "Example sentence," "Definition," "Related words" and so on. When the learner registers the word, he/she will first choose his/her familiarity level of the target word from 1 (I have seen this word) to 5 (I can make a sentence with this word). The learner also has to decide whether he/she wants to practice the word or not by choosing "yes" or "no" at the "Practice later?" section. In this way, *Lexinote* encourages the learner to take control of and feel ownership for his/her own learning processes. Typical learning stages and activities are described in Table 2.

The screenshot shows the Lexinote interface for the word "London". At the top, there is a search bar containing "London" and a green "New" button. Below the search bar is a text box containing the definition: "London is a leading global city, with strengths in the arts, commerce, education, entertainment, fashion, finance, healthcare, media, professional services, research and development, tourism and transport all contributing to its prominence. It is one of the world's leading financial centres and has the fifth-or sixth-largest metropolitan area GDP in the world depending on measurement. London is a world cultural capital." Below the definition is an "(Update)" button. Underneath is a status bar with the text "(Register the Word) Learned Not Learned Learned HWL Not Learned HWL (Not in Dictionary) Learned Not Learned". Below the status bar is a green bar with "Check Registered Items" and a button "open all the words". The main text area shows the definition with words color-coded: "London is a leading global city, with strengths in the arts, commerce, education, entertainment, fashion, finance, healthcare, media, professional services, research and development, tourism and transport all contributing to its prominence. It is one of the world's leading financial centres and has the fifth-or sixth-largest metropolitan area GDP in the world depending on measurement. London is a world cultural capital." Below this is a "Memo" text area. At the bottom, there is a "Referenced URL:" label and a text input field containing "Referenced URL". There is also a "Share" button and a large green "Save" button.

Figure 1. Self-study note on *Lexinote*.

[weblio] [類語辞典] [ロングマン英英] [英辞郎]


incremental 

New **Modify**

Noun Verb Adj
 Adv Other

Meaning

ますます増加する


Example Sentence 

Abe said that progress on reforms would be incremental



Definition

increasing in amount or value gradually and by a regular amount

Related Words

Self-expression 

Familiarity

★★★★  

Practice later?

Yes
 No

Figure 2. Notebook section on Lexinote.

Learning Stage	Activity on <i>Lexinote</i>
Choosing a target word to learn	Input a word in the notebook or click the word on self-study note
Discovering the meanings of the target word	<ul style="list-style-type: none"> • Check automatically displayed L1 equivalents if the word is in the dictionary data • Click a dictionary button to refer to an online dictionary website
Taking notes about the target word	Edit the fields in the notebook section (meaning, example sentence, definition and related words) depending on familiarity
Registering the target word	Choose one of five familiarity levels and decide whether to practice the word or not
Rehearsing the target word	Click one of the four rehearsal buttons in the MyPortfolio section to practice the registered words
Writing a sentence using the target word	Register a sentence using the target word either through the rehearsing function or by inputting it in the self-expression field on the notebook section
Monitoring the registered target words	Review the registered words in the MyPortfolio section and adjust word familiarity when necessary

Table 2. Typical learning stages and activities on *Lexinote*.

2.5. Class assignment using *Lexinote*

To further enhance sustainable vocabulary learning, *Lexinote* allows instructors to feed assignments to their learners. There are two assignment types, website and video, and each of them specifies certain words as targets to be learned. In the website assignment type, a teacher designates a given website, usually one that contains the targeted words in text so that learners can meet and learn words in context. In the present researchers' case, the purpose is to have learners master a specific word list (HWL942), so they specify a blog page consisting of the target words, definitions, example sentences and an audio file introducing the target words and information (e.g., <http://hguweb.jp/humanities-942/140/>). The second assignment type, video assignments, allows teachers to feed a YouTube video containing target words and to provide a simple computer-mediated communication function to enhance learners' communication regarding the assignment. Learners can post their comments and also reply to other learners' comments on the assignment page (Figure 3). The words that learners use in their posts and replies are all recorded and stored in the e-portfolio.

「～であつたら（すれば）いいのに。」、「～であつたら（していたら）よかつたのに。」という、現実ではないこと、起こる可能性が低いことを願う表現はwish + 過去形（もしくは過去完了形）を使います。同じ「願う」という意味の動詞“hope”は何かが実際に、現実的に起こってほしいときに使うのに対し、“wish”を使う場合は、その願う事が叶う可能性は低いです。“I wish I had brothers and sisters.”「兄弟がいればいいのになあ。」この場合うしるの動詞“have”は過去形の“had”になります。形は過去ですが意味は現在、または未来を表します。また、過去の出来事に対する願望を表したいときは、“I wish I had gone to the party last night.”「昨日のパーティーに行っておけば良かったなあ。」のようにうしるの動詞は過去完了形の“had + 過去分詞”となります。前回の例文とつなげて見てみましょう。

“Sorry, I should have told you at the last time we met, but she moved to a new place already.”
「ごめん、この間会つた時に伝えれば良かったんだけど、彼女はもう引っ越したよ。」

I wish I had studied Chinese. 2013年10月23日 17:10
 You should study Korean. 2013年10月23日 17:11
 I wish it snowed a lot. I can go back to my hometown, and I will relax there. 2013年10月23日 17:10
 I wish I could play the piano very well. 2013年10月23日 17:10
 ATSUSHI can play the piano very very very very well. 2013年10月23日 17:13
 I wish I couldn't be absent writing class last week. 2013年10月23日 17:10
 you had not been absent? 2013年10月23日 17:11
 you decide to be not absent from writing class from now. 2013年10月23日 17:16
 I wish I had spoken more to her before graduation. 2013年10月23日 17:09
 I wish I went to World Cup in Brazil. 2013年10月23日 17:09

Submit

Figure 3. Assignment screen and learners' comments on *Lexinote*.

2.6. Rehearsal functions

In order to facilitate learners' metacognitive control, *Lexinote* requires learners to decide whether they want to practice the target word later when registering it in the e-portfolio. Learners' judgment to practice or not is itself a manifestation of the strategy of metacognitive control; likewise, each rehearsal function is designed to incorporate one of the VLS listed in Table 1 depending on the word familiarity level. Details of each rehearsal function are described in Table 3.

Word Familiarity	Rehearsal function	Vocabulary learning strategy
1 to 2	<ul style="list-style-type: none"> recalling meaning from sound of the target word recalling meaning from spelling of the target word typing the target word from its sound 	oral rehearsal written rehearsal written and oral rehearsal
2 to 3	<ul style="list-style-type: none"> typing the target word from its L1 equivalent typing the target word from its definition 	written rehearsal written rehearsal
3 to 4	<ul style="list-style-type: none"> typing the target word in an example sentence 	written rehearsal language exposure
4 to 5	<ul style="list-style-type: none"> making a sentence with the target word 	language exposure

Table 3. Rehearsal functions and vocabulary learning strategies according to word familiarity.

3. Learners' Evaluation of *Lexinote*

3.1. Purpose

In order to assess EFL learners' perception of the usefulness of *Lexinote*, the authors designed and conducted a questionnaire survey. The research questions are:

1. To what extent do Japanese EFL learners perceive the vocabulary e-portfolio functions to be effective for vocabulary learning?
2. In evaluating their learning with the vocabulary e-portfolio, what aspects are salient for Japanese EFL learners?

3.2. Method

The participants are 63 (F18/M45) EFL learners enrolled in a general English course targeting a test for international communication (TOEIC ®) from two intact classes. All of them are first-year students, meaning they have had at least six years of English study in Japanese schools, at a private Japanese university. None of them have had the experience of staying more than a month in any English speaking country.

Six of the items elicit the participants' perception of the usefulness of *Lexinote* and of its different features: the e-portfolio itself, the compilation of learning records in the notebook, the online dictionary, the rehearsal function, word familiarity rating, and class assignments. The seventh item is about the participants' satisfaction regarding learning with *Lexinote*, and the final item inquires the reasons in free description form. The participants were asked to respond to the first seven items by indicating their level of agreement using a six-point Likert scale (0: Completely disagree to 5: Completely agree). A six-point Likert scale was used in order to avoid ambiguous judgements due to choosing the point in the middle. Seven weeks after *Lexinote* was introduced in the course, the participants' responses were collected anonymously via an online learning management system (Moodle 1.9.6).

3.3. Results

Table 4 shows the descriptive statistics of the seven items regarding the participants' perception and evaluation of *Lexinote*. The reliability of the questionnaire was satisfactory as assessed by Cronbach's alpha coefficient ($\alpha = 0.91$).

Item	M	SD
1. <i>Lexinote</i> is useful for my vocabulary learning.	3.57	1.00
2. The notebook on <i>Lexinote</i> and its learning records are useful for my vocabulary learning.	3.38	1.08
3. The online dictionaries on <i>Lexinote</i> are useful for my vocabulary learning.	3.73	1.10
4. The rehearsal functions on <i>Lexinote</i> are useful for my vocabulary learning.	3.63	1.00
5. Managing learning by word familiarity is useful for my vocabulary learning.	3.27	1.10
6. The class assignments on <i>Lexinote</i> are useful for my vocabulary learning.	3.65	1.02
7. I am satisfied with vocabulary learning using <i>Lexinote</i> .	3.38	1.14

Table 4. Descriptive statistics of the participants' perception of *Lexinote*.

The free description responses to Item 8 were grouped into responses from participants who had marked Item 7 from 1-2 points (the negative response group, $n = 11$) and those who had marked it from 3-5 points (the positive response group, $n = 52$). (Note: no students had marked this item as 0.) Typical responses are shown below. Some of the comments for Item 8 from the negative group include:

It's just copying and pasting. (Student A)

It looks complicated. (Student B)

I don't want to use a PC for studying. I'd rather use paper and pencil. (Student C)

The comments from the positive group include:

It's a good thing to see what words I'm learning and how well I'm learning. (Student D)

It's helpful for me to practice the same words repeatedly. (Student E)

It has increased my time to be exposed to English. (Student F)

I had been feeling I needed to learn more vocabulary, and Lexinote helps my self-study. (Student G)

*All comments are translated from Japanese into English by the authors.

4. Discussion

As for research question 1, the overall results of the questionnaire revealed the learners' positive evaluation of *Lexinote*, with 52 participants, more than 80% of the total participants, responding that they are satisfied with vocabulary learning with *Lexinote* seven weeks after starting to use it (Item 7). Though this result cannot be compared to the results of other groups of learners as in a rigorously designed experimental study, it would be fair to say that learning with *Lexinote* is generally supported by most participants. The result of Item 1 also reveals that the participants perceived *Lexinote* as useful for vocabulary learning. The slight differences in the mean scores of other items help explain the participants' preferences for vocabulary learning. Items which receive a comparatively higher evaluation are those describing resources and opportunities for learning such as Item 3, 4 and 6, rather than items describing features that aim to enhance learners' independent and self-regulated learning such as Item 2 and 5. This implies that the learners need considerable assistance in vocabulary learning before they are able to establish independent and sustainable learning. However, this should be further investigated as this survey was conducted only seven weeks after the system was introduced. In the future, a longitudinal study should be conducted to examine further changes in learners' perceptions and attitudes, either positive or negative, toward vocabulary learning.

As for research question 2, the participants' responses to Item 8 give insight into different perceptions by the participants. A glance at comments by the negative group suggests that more careful instruction is needed for some learners to fully recognize the advantages and disadvantages of using technology for their learning. Though some may prefer learning with paper and pencil, this could be complemented by learning via computer in a wider view as, for example, *Lexinote* allows its users to download their data of learning and learned vocabulary in a comma separated value (CSV) file format so that they can print it out as their own word list for self-study. These comments, however, imply that some learners think that they have to choose either learning with paper and pencil or learning with computer. Students may need explicit instruction on how to combine the new learning methods, i.e., use of ICT, with familiar methods, i.e., paper and pencil. On the other hand, comments from the positive group reveal that these participants do understand the underlying aims of vocabulary learning with

Lexinote. They are aware not only of the obvious advantages of learning with technology such as “practicing the same words repeatedly” and “increasing time for studying”, but also of the metacognitive advantages of e-portfolio to “see what words and how well” they are learning. Cautions have to be made here too, however, as learners' perceptions likely evolve with a longer period of learning. Therefore, future research should probe learners' perceptions and actual learning outcomes in an extended learning period.

5. Concluding remarks

Because *Lexinote* helps learners visualize the words they meet, record, practice, and use, it will be of benefit to both learners and instructors in monitoring and controlling sustainable vocabulary learning. It is learners and their instructors who are at the center of learning, not the algorithm of a system that automatically controls overall learning. Constantly seeing what they are learning, and what they have learned, learners can better understand their current status and future goals in their own vocabulary learning. Understanding what and how learners have and have not learned, instructors can better assist them by providing appropriate assignments and advice.

Although *Lexinote* specifically targets Japanese EFL learners and instructors, the system is available for public use from April 2014 (<http://app.lexinote.com/>). This will enable CALL researchers and developers to better enhance sustainable vocabulary learning in any language in various settings by rewriting and redistributing the system. The authors also hope to conduct and report a longitudinal and empirical study to examine the effect of using the e-portfolio system on EFL learners' vocabulary acquisition and retention in the near future.

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