FeedLearn: Using Social Feeds for Microlearning

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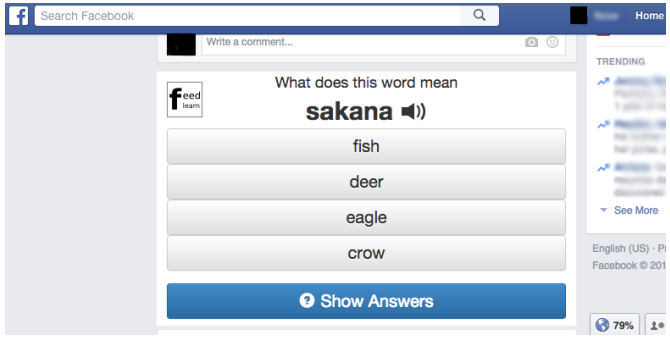

Figure 1: FeedLearn showing an interactive vocabulary quiz inside a user's Facebook news feed

Abstract
Many long-term goals, such as learning a new language, require the person to spend a small amount of time each day to achieve them. At the same time, people regularly browse social news feeds in their spare time. Our system, FeedLearn, exploits the regularity with which people spend their time reading news feeds on Facebook, in order to present them with vocabulary quizzes they can answer directly inside their feeds. It is implemented as a Chrome extension, as Facebook's API does not currently allow such flexible in-feed interactions. In our preliminary user study, we find that over the course of a week, we are able to teach students an average of 13 new vocabulary words by injecting microlearning tasks into their Facebook feeds. This is more than the 4 vocabulary words learned if we insert links leading them to visit an external site to study, as is done by current Facebook apps.

Author Keywords
microlearning, social feeds, language learning

ACM Classification Keywords
H.5.m. [Information Interfaces and Presentation (e.g. HCI)]: Miscellaneous

Introduction

People spend large amounts of time reading their news feeds on social networking sites like Facebook. 71% of American adults with an internet connection use Facebook. Of these, 63% visit Facebook at least once a day, and 40% visit it multiple times per day [4]. Among American college students, 90% use Facebook [7]. College students who use Facebook report spending an average of 30 minutes per day on Facebook [13]. Clearly, Facebook news feeds present an opportunity for influencing the behavior of users.

In this paper, we present FeedLearn, a technique for allowing users to interactively study flashcard-like content, such as vocabulary, as they browse through their Facebook feeds. Our research questions are:

- Are people more likely to engage with microlearning tasks if they can do so without leaving their Facebook feeds?
- Does the in-feed question study result in higher learning outcomes than the links to external sites used by current Facebook applications?
- Does the regularity and frequency with which users visit Facebook make it suitable for microlearning?

Our preliminary user study compared Japanese vocabulary acquisition rates through FeedLearn's in-feed learning mechanism, to the style of inserting reminders to visit an external website to study, as is currently used by Facebook applications. We found that users were able to learn twice as many new words on average (11 new words, vs 5 new words) over a weeklong period when they could do the quizzes inside the feeds.

Related Work

Microlearning

Microlearning is a strategy of using short periods of time throughout the day to study. It has been used for applications such foreign vocabulary learning via mobile apps [1] [6]. A weakness of needing a separate app for microlearning is that it requires the user to interrupt their routine and open an app to study.

Some systems have attempted to solve this problem by embedding microlearning into other contexts. There are games where users complete learning tasks while playing [2], video players which teach vocabulary while watching foreign-language videos [11], screensavers that show facts while the screen is idle [10], and chat clients that show vocabulary while the user is chatting [3].

Compared to the learning contexts used by existing work, we believe the Facebook feed is an especially good opportunity for microlearning, because:

- Unlike playing educational games or watching foreign-language videos, visiting Facebook is part of the daily routine of nearly half of American adults with an internet connection [4]
- Unlike a screensaver which is dismissed once the mouse moves, users can interact with quizzes they see in their Facebook feeds.
- Unlike needing to respond to a chat message, there are no interruptions to the user's learning while they are browsing their Facebook feeds.
- Users are already used to a variety of rich content appearing in their Facebook feeds, such as videos their friends liked, posts from games and apps, recommendations, and advertisements.

News Feeds as a Persuasive Technology
Since the emergence of the Facebook app development platform, there have been many attempts to use it as a platform for persuasion. For example, apps like NikePlus broadcast users' running progress, and apps like Duolingo broadcast users' study progress on the platform. These messages may also invite the user's friends to participate in the activity. A key advantage that social platforms like Facebook provide over generic messaging is that friends can be associated with requests, increasing their potential persuasiveness via social pressures [9].

However, there are many caveats with applications auto-posting messages on users' behalves. Messages auto-posted by applications receive little attention from the user's friends, compared to messages that they have posted themselves. The user's audiences may also perceive their application-associated posts as either trivial achievements or bragging, ignoring them [8]. It is thus suggested that these auto-posted messages be shared only with the subset of the user's friends who are likely to be interested. However, users are unwilling to invest the effort to identify these social circles [8].

Study groups on Facebook
There are a number of Facebook pages that post daily "word of the day" style lessons for learners, such as KoreanClass101. If users subscribe to these pages (by clicking the Like button), they will see periodic reminders to visit an external site to study vocabulary, as shown in Figure 2. There are many users subscribed to these services – for example, the KoreanClass101 page has 70 thousand subscribers. These services have a number of weaknesses that FeedLearn aims to address:

- Not interactive: users need to visit an external site to do quizzes or see other words.
- Not personalized: all 70 thousand subscribers will see the same daily word posted, regardless of whether they already know that word.
- No spaced repetition: a new word is posted each day, and older ones are never repeated.
- Content needs to be manually generated: a group moderator needs to write a new post each day

Figure 2: An example Daily Word post from KoreanClass101, a Facebook service with 70 thousand subscribers.

FeedLearn Interface

FeedLearn is a Chrome extension which inserts interactive vocabulary quizzes into the user's Facebook feeds. It supports several languages, but we will focus on the

version that teaches basic Japanese vocabulary in this paper.

Quiz Types
One type of quiz presents a present a noun in the native language, and ask the user to select the corresponding foreign-language word, as shown in Figure 3. In order to ensure that users learn to recognize the word associations in both ways, we also have a second type of quiz, in which the user is shown a word in the foreign language and selects the corresponding word in their native language, as shown in Figure 4.

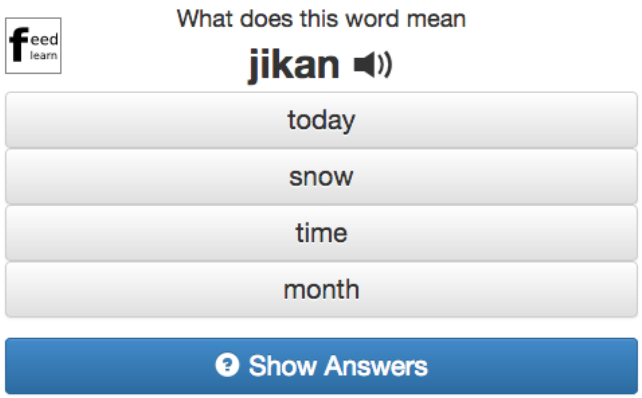

Figure 3: One type of quiz presents a noun in Japanese (*jikan*), and asks the user to select its meaning (time).

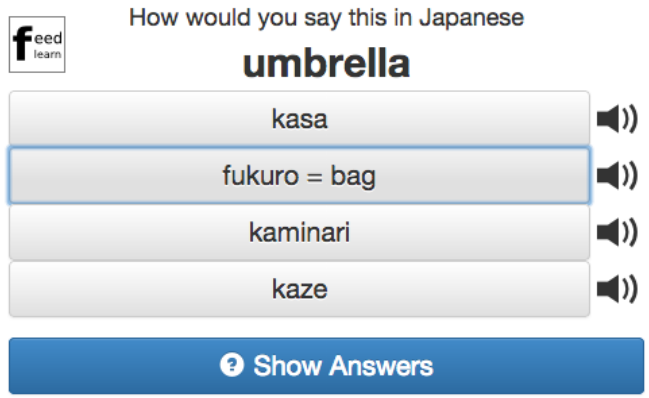

Figure 4: Another type of quiz presents a noun in English (umbrella), and asks the user to select the correct translation into Japanese (*kasa*). The user has incorrectly selected *fukuro*, so the user is shown its meaning (bag), and tries again.

We opt to use this interactive quiz format, rather than simply showing pairs of words and translations or asking users to explicitly recall and type out translations for words, because it allows us to take advantage of the testing effect with a minimal amount of interaction – the user simply clicks on a word to answer. Once the user answers a quiz correctly, a new quiz testing a different word is shown. Thus, users can continue to study for as long as they wish to.

Quiz Generation
Our words and definitions were taken from the Nouns section of Wiktionary's 1000 Basic Japanese Words list. We excluded loanwords that users would easily recognize (*pinku*=pink), and words that are homographs when romanized (*hana*=flower or nose). We focus on nouns, because they are the most common type of word – the majority of words in the Oxford English dictionary are

nouns [1]. FeedLearn can optionally show the word in the native script (kana/kanji for Japanese), or display a picture of the word. However, we did not show these in our user study, because our users could not read Japanese scripts, and not all words can be visualized with a picture (ex: year).

Spaced Repetition
We use the Memreflex spaced-repetition algorithm to ensure that items are appropriately spaced for review, and new items are introduced only once the user is ready to learn more [5]. However, we show the word due for review that has been seen least recently in the feed, as opposed to always showing the most overdue word as Memreflex does. This ensures that users will continue to see different words as they are scrolling through their feeds, even if they are not always answering the quiz questions.

Inserting Quizzes into Feeds
We insert quizzes into feeds so that they will be encountered at a rate of 1 quiz every 10 posts. We picked this rate, as this was similar to the frequency we observed advertisements and sponsored content appearing in Facebook news feeds. Hence, our should not distract users any more than existing advertisements.

Preliminary User Study

We conducted a preliminary user study to compare the effectiveness of inserting interactive quizzes directly into users' Facebook feeds, versus inserting links to the quizzes as is commonly done on Facebook today.

Figure 5: The control condition in our user study inserted a link into users' Facebook feeds that led them to a site where they could do vocabulary quizzes

Participants
We recruited 14 users who had not previously studied Japanese, who were interested in learning some basic vocabulary. They were voluntary participants recruited from online forums and Facebook groups related to Japanese culture. All of our participants were regular users of Facebook.

Materials
We used 50 basic Japanese words from Wiktionary's Basic Japanese Words list as the study material. We presented vocabulary words in romanized form rather than the standard Japanese orthography, as our users could not read Japanese scripts.

Conditions
Users were assigned to one of two conditions:

- Users in the *in-feed quiz* condition had quizzes inserted directly in their feeds, as shown in Figure 1.
- Users in the *link* condition had links inserted into their feed which led them to a site where they could

do the quizzes, as shown in Figure 5.

Apart form the different items (quizzes vs links) inserted into user's feed, the questions and quiz interfaces were identical in the two conditions. In both conditions, the links/quizzes were inserted at a rate of 1 link/quiz per 10 feed items.

Procedure
The study was conducted entirely online. First, we asked users to take a pre-test, to verify that they did not already know the vocabulary that we intended to teach them. In the pre-test, users tried matching the 50 Japanese words to their 50 English definitions. Then they installed our chrome extension and used it to learn the 50 words for a week. After a week elapsed, we asked them users to do the post-test, which had the same format as the pre-test.

Results

Vocab Quiz Results

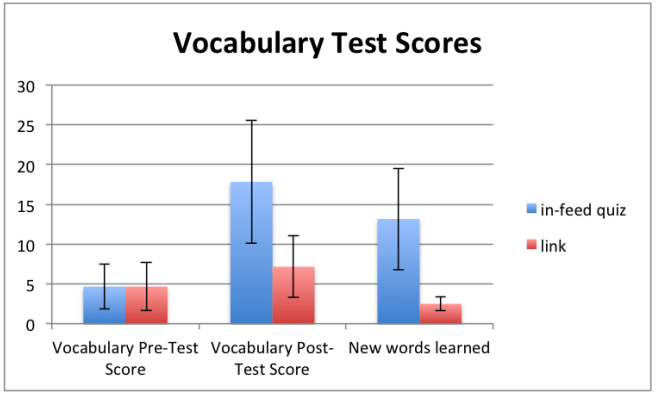

Figure 6: Vocabulary test scores for the in-feed quiz and link conditions, with standard error bars

Average vocabulary pre-test and post-test scores are shown in Figure 6. On average, users in the in-feed condition learned 13.2 new words, vs 2.5 in the link condition. However, this was not statistically significant (t=1.51, p=0.16).

Logged Interactions
The number of times users practiced answering quizzes is shown in Figure 7. We also kept track of "study sessions", which we defined as the number of times the user clicked on the link to visit the external website (in the link condition), or first answered a quiz that was inserted into their feed (in the in-quiz condition). Because there were a handful of extremely heavy Facebook users, we also show number of answers and sessions normalized by the number of feed insertions. On average, we found that users in the in-feed quiz condition answered significantly more quizzes than the link condition, and had more study sessions.

Logged event type	in-feed quiz	link	Significant difference?
Number of answers	**116.3**	**17.4**	**Yes (t=2.42, p=0.032)**
Number of study sessions	**21.29**	**1.57**	**Yes (t=2.68, p=0.020)**
Number of feed insertions	132.1	89.6	No (t=0.80, p=0.442)
Ratio of answers to insertions	2.32	1.03	No (t=0.82, p=0.428)
Ratio of study sessions to insertions	0.25	0.098	No (t=1.27, p=0.227)

Figure 7: Average number of events logged per user for the in-feed quiz and link conditions.

Discussion

Some users mentioned that it was awkward to be immediately quizzed on words and would have preferred them to have been introduced first.

In addition, there are many cases when items are seen in the feed, but not interacted with. In the in-feed condition, only X of Y items that were inserted in the feed were interacted with. In the link condition, only . In our next

iteration of FeedLearn, we are addressing these by having a third type of item inserted into feeds that simply introduces a new word-definition pair, or serves to reinforce their memory of it.

Conclusion

Injecting small, actionable tasks into users' Facebook feeds presents an opportunity to influence behavior. Although we have studied foreign-language vocabulary acquisition in this study, our approaches should be equally applicable to other flashcard-like educational content that takes relatively little effort to consume and could be easily injected and interacted with directly inside a social news feed. One could also use a similar mechanism to encourage other behaviors that need to be done for short periods of time on a daily basis, such as small amounts of exercise.

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