Students' views on the helpfulness of multimedia components of digital flashcards in mobile-assisted vocabulary learning

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Abstract. This study examines learners' perceptions of the helpfulness of various multimedia components embedded in digital flashcards for explicit, informal foreign language vocabulary learning. Advanced learners of English (N=59) studied 48 new words using digital flashcards on smartphones. After ten days, the learners completed perception surveys. The goal of this study was to investigate which flashcard components were perceived as most helpful in learning vocabulary. The results of nonparametric statistical tests revealed that students perceive Foreign Language (FL) definitions to be significantly less helpful compared to other flashcard components. Moreover, when given a choice between having access to translation or pronunciation, translation was perceived as significantly more helpful in vocabulary learning. These findings have practical implications for the development of multimedia digital flashcards in mobile-assisted language learning applications.

Keywords: digital flashcards, mobile-assisted language learning, foreign language vocabulary.

1. Introduction

In the context of mobile-assisted language learning, the use of flashcards for studying vocabulary has attracted considerable research interest (Byrd & Lansing, 2016). In a large-sample study (N=247) by Wissman, Rawson, and Pyc (2012), over 80% of students pointed to vocabulary learning as the main area where they

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How to cite this article: Kaplan-Rakowski, R., & Loranc-Paszylk, B. (2017). Students' views on the helpfulness of multimedia components of digital flashcards in mobile-assisted vocabulary learning. In K. Borthwick, L. Bradley & S. Thouësny (Eds), *CALL in a climate of change: adapting to turbulent global conditions – short papers from EUROCALL 2017* (pp. 170-176). Research-publishing.net. https://doi.org/10.14705/rpnet.2017.eurocall2017.708

used flashcards. Apart from a growing body of studies testing the effect of mobile devices on vocabulary learning, researchers have explored students' experiences and preferences within this learning environment.

Previous studies showed that students perceived learning vocabulary on their mobile phones as engaging (Azabdaftari & Mozaheb, 2012), effective, and entertaining (Başoğlu & Akdemir, 2010). Hung (2015) further identified participants' positive attitudes towards the use of flashcards in such categories as perceived usefulness, perceived ease of use, and intention to use.

Various studies exploring the use of mobile phones in vocabulary learning focused on multimedia components. For example, Lin and Yu (2017) used four different modes (i.e. components) of vocabulary presentation on mobile phones: text only (translation and example sentences), text plus image, text plus sound, and all the modes combined. The majority of subjects (N=32) perceived the vocabulary presentation as motivating (81.3%), effective (93.8%), and beneficial (96.9%). Over 90% of subjects considered each of the presentation components as necessary for learning new words. However, it was beyond the scope of that study to precisely test how each of the presentation components was perceived relative to the others.

Our study fills this research gap by comparing learners' perceptions of the helpfulness of different presentation modes/components for learning new vocabulary with flashcards. Our research question was: *"Which flashcard components do students perceive as helpful in explicit vocabulary learning?"*. We then looked into a more detailed question examining to what degree each of the components were perceived to be helpful.

2. Method

2.1. Participants

The 59 participants were all native speakers of Polish studying English at an advanced level. The subjects were sent 48 digital flashcards containing English nouns. The learning process took place on the students' personal smartphones using the *AnkiDroid* app. After ten days, the learners completed a survey measuring their perceptions of the helpfulness of flashcard components for learning new vocabulary.

2.2. The survey

We report on two survey questions:

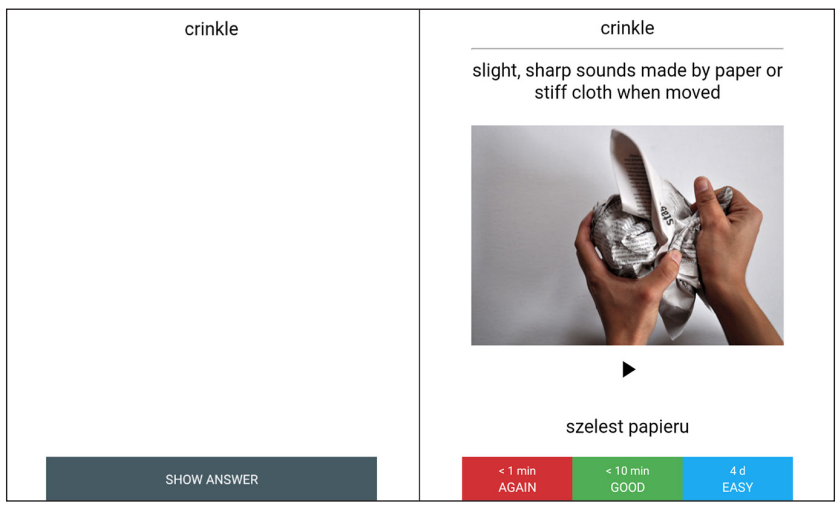
- *Which flashcard components did you find most helpful?*: For this multiple-choice question, we calculated the percentage of subjects who reported each flashcard component as being helpful.

- *To what degree did you find each of the flashcard components helpful?*: For this Likert scale question (1='not helpful at all' and 5='very helpful'), we conducted a nonparametric Friedman test, followed by pairwise Wilcoxon signed-rank tests.

2.3. Flashcard design

Each flashcard had a front and back side (see Figure 1). The front side contained the target word. The back side presented a relevant image representing the target word, the FL definition, and the Polish translation. There were also flashcards with the pronunciation of the target word, the sound effect associated with the target word, or the combination of the two audio enhancements. Consequently, flashcards had the following components: the target word, the FL definition, the Polish translation, the image, the pronunciation, the sound effect, and the combination of pronunciation plus sound effect.

Figure 1. An example of the front side (left) and the back side (right) of a flashcard



3. Results

Out of the 59 participants who completed the survey, 66% reported using the flashcards about three times in ten days. Most learners (58%) reported feeling that studying vocabulary with the flashcards was effective and 51% of them reported that they found it engaging.

3.1. Flashcard components perceived as helpful in learning vocabulary

One of the questions was *"Which components of the flashcards did you find helpful in vocabulary learning?"*. As Table 1 shows, the highest percentage of students reported the image (74.58%), followed by the translation (61.02%), as most helpful in learning.

Table 1. Flashcard components and percentages of students reporting the components as helpful

Flashcard components	%
Image	74.58%
Translation	61.02%
Sound effects	44.07%
Sound effects + pronunciation	42.37%
Pronunciation	32.20%
Translation + FL definition	20.34%
No sound	1.69%

3.2. Degree of the helpfulness of flashcard components

Our other question of interest was: *"To what degree were the flashcard components helpful?"*. As seen in Table 2, the median values reported for translation and for image were the highest, while the median value reported for FL definition was the lowest.

Table 2. Medians and mean ranks of flashcard components

Flashcard components	Median	Mean ranks
Polish translation	5	4.27
Image	5	4.02
Sound effects + pronunciation	4	3.81
Sound effects	4	3.60
Pronunciation	4	3.16
FL definition	3	2.14

The analysis of the Friedman test procedure revealed the mean rank to be the highest for translation (M=4.27), followed by images (M=4.02), with FL definitions being the lowest (M=2.14). The test showed a statistically significant difference between the components: $\chi^2(df=5, N=59) = 64.04$, $p<0.001$. To establish which flashcard components were perceived to be more helpful, we conducted post hoc analysis with Wilcoxon signed-rank tests, reported in Table 3. The Bonferroni correction (for 15 possible pairwise combinations) resulted in a significance level set at $p<0.0033$. Pairwise comparison tests revealed that FL definitions were perceived as less helpful compared with any other components. Further, when pronunciation and translation were compared, pronunciation was perceived as significantly less helpful than translation.

Table 3. Wilcoxon sign-rank test statistics

	Z	**Sig.**
image vs definition	4.75	<0.01*
image vs translation	0.72	0.47
image vs pronunciation	2.90	<0.01
image vs sound effects	1.69	0.09
image vs (pronunciation and sound effects)	1.27	0.20
definition vs translation	5.43	<0.01*
definition vs pronunciation	3.23	<0.01*
definition vs sound effects	3.91	<0.01*
definition vs (pronunciation and sound effects)	4.87	<0.01*
translation vs pronunciation	4.05	<0.01*
translation vs sound effects	2.48	0.01
translation vs (pronunciation and sound effects)	2.18	0.03
pronunciation vs sound effects	1.66	0.10
pronunciation vs (pronunciation and sound effects)	2.15	0.03
sound effects vs (pronunciation and sound effects)	0.70	0.49
* Indicates significance at the 95% level with the Bonferroni correction		

4. Discussion

Our analysis provided us with two major outcomes. First, students did not find FL definitions helpful on flashcards compared with other flashcard components. On the one hand, this is somewhat surprising because advanced language learners are more likely to read more challenging FL definitions in the target language than novice language learners. On the other hand, this is consistent with translations and images being sufficient, with no additional need for FL definitions. In fact, it is possible that definitions occupy too much space on already small smartphone

screens, causing cognitive overload, which is disadvantageous for learning (Sweller, 1994).

Our second main finding is that when students are given a choice between having pronunciation and translation as a component of their flashcard, translation is perceived as significantly more helpful than pronunciation. We may assume that students prefer translations because they are carriers of semantic information and explain the meaning of new words. At the beginning of the learning process, the meaning-form link is probably most important (Schmitt, 1998).

5. Conclusions

This study investigated students' perceptions of multimedia flashcard components studied on smartphones for explicit vocabulary learning. Overall, most learners expressed positive feedback regarding the perceived effectiveness and engagement towards the flashcards. Our statistical analyses provided evidence that FL definitions are not perceived to be helpful compared to other flashcard components, such as translation, image, pronunciation, sound effects, or pronunciation plus sound effects. Furthermore, pronunciation recordings are not perceived as significantly more helpful than translations. Flashcard designers (whether they are teachers, instructional designers, or students themselves) can benefit from these findings by including or excluding those components in their flashcard creation.

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Published by Research-publishing.net, not-for-profit association
Contact: info@research-publishing.net

CALL in a climate of change: adapting to turbulent global conditions – short papers from EUROCALL 2017
Edited by Kate Borthwick, Linda Bradley, and Sylvie Thouësny

Typeset by Research-publishing.net

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ISBN13: 978-2-490057-04-7 (Ebook, PDF, colour)
ISBN13: 978-2-490057-05-4 (Ebook, EPUB, colour)
ISBN13: 978-2-490057-03-0 (Paperback - Print on demand, black and white)
Print on demand technology is a high-quality, innovative and ecological printing method; with which the book is never 'out of stock' or 'out of print'.

British Library Cataloguing-in-Publication Data.
A cataloguing record for this book is available from the British Library.

Legal deposit: Bibliothèque Nationale de France - Dépôt légal: décembre 2017.