

A comparative research on the effectiveness of two mobile applications for vocabulary learning: BaiCiZhan and Bubeidanci

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ABSTRACT

In recent years, with the development of science and technology, more and more language teachers and researchers pay attention to the application of mobile devices in language learning. However, few studies have explored the effectiveness of specific vocabulary learning applications in the Chinese context and made suggestions for students' choices. This research involves 16 participants using two popular Apps named BaiCiZhan and Bubeidanci respectively. They were required to do a pre-test, two immediate post-tests and a delayed post-test, to compare the difference in the effect of vocabulary retention of the two apps. The results showed that although both apps significantly improved the retention effect immediately after learning and one week after learning, there was no difference between the two apps. In addition, interviews were conducted to investigate the participants' experience of using the two apps and combining the vocabulary learning strategies used in two apps. This study concluded that the learning style preference of learners could be seen as a factor, and the two most important vocabulary learning strategies respectively used by the two apps which are using pictures and using various context sentences both have their own advantages and disadvantages, which makes no difference in the final result of word retention between the two apps.

Keywords: Second language vocabulary acquisition, mobile phone applications, image aids, context sentences

1. INTRODUCTION

With the development of technology, mobile-assisted language learning (MALL) has been discussed by more and more researchers and applied in language teaching. To define MALL, Kukulska-Hulme (2020) indicates that MALL is the use of smartphones and other mobile technology in language learning, particularly where portability and contextual learning offer particular benefits¹. According to Chen and her colleagues' meta-analysis of the effectiveness on MALL, many researches show that students can gain benefit by using mobile devices compared to using traditional ways². For example, Gurkan (2018) found that mobile-assisted vocabulary learning application *VocaStyle* is effective and motivating³. However, most of the previous studies have focused on vocabulary teaching rather than providing learners with opinions on the selection of MALL applications. This study compares the two most popular apps BaiCiZhan and Bubeidanci in the Chinese MALL application market, tests their effectiveness and differences in word memory retention, and analyzes their respective advantages and disadvantages, hoping to provide some advice for English teachers and app developers.

2. RESEARCH QUESTIONS

Q1: Is there any difference in promoting L2 vocabulary learning immediately after using 'BaiCiZhan' and 'Bubeidanci'? If so, which is more effective, 'BaiCiZhan' or 'Bubeidanci'?

Q2: Is there any difference in promoting L2 vocabulary learning one week after using 'BaiCiZhan' and 'Bubeidanci'? If so, which is more effective, 'BaiCiZhan' or 'Bubeidanci'?

Q3: What are the factors that might influence the difference in learning and memory effectiveness by using 'BaiCiZhan' and 'Bubeidanci'?

3. METHODOLOGY

The mixed research method was adopted in this study and 16 undergraduates from EDUHK were involved in the

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experiment. The first part is quantitative research, including a pre-test, two immediate post-tests and a delayed post-test. All tests required participants to filling in Chinese translation for the reason that the meaning of words in the first language is easier to understand and the use of the first language enables learners to establish a deep connection with the words. Participants received two points for accurate translation, one point for nearly correct translation and zero for wrong answers. The pre-test of selected 30 words were conducted one week before the learning stage, aiming to assign target words to each app and to make sure the difficulty of the words is the same in both apps by comparing the pre-test results of two apps. Then participants were required to learn vocabulary using two apps (15 words in each) and followed by two immediate post-tests. One week later, participants were tested on the memory retention effect of 30 target words. The second part is qualitative research, in which participants were interviewed in Chinese about their experience with two apps for 5-10 minutes.

The mobile applications for learning vocabulary in this research are BaiCiZhan and Bubeidanci. They have common in using audio and using repetition learning strategy. The study of Ramezanali and Faez (2019) indicates that multimedia presentation mode involved L2 definition, audio and video animation is more effective than the single mode for vocabulary learning and retention⁴. Similarly, Yawiloeng (2020) finds that the association between audio and imagery plays a vital role in vocabulary learning, because sound and image are integrated into prior knowledge to construct a word's knowledge and thus form a long-term memory⁵. Moreover, the frequency effect of words shows that frequently occurring and recently occurring words are more likely to become easily extracted words in learners' brains⁶.

The learning strategy that BaiCiZhan solely have is using image, whereas Bubeidanci is featured with its various context example sentences.

4. RESULTS AND DISCUSSION

Table 1 shows the increase of vocabulary retention with the two apps respectively. Comparing the mean gain in the immediate post-test with the pre-test, there is no significant difference in performance improvement between the two apps ($P < 0.05$). Pair t-test was used to compare the two sets of data, and it was found that the mean gain of using the two app in the immediate post-test was 16.000 and 15.313. The same experimental results appeared in the comparison of the delayed test with the pre-test (Table 2). Pair t-test was also used to compare the results of the two groups, $p = 0.232$ ($p < 0.05$) showed that there was no significant difference between the two apps in terms of mean gain after one week. However, the average increase of the two apps in the delayed post-test was 10.56 and 9.38 respectively, which was lower than that in the immediate post-test.

Table 1. The comparison of the score increase of immediate post-test versus pre-test using two apps.

APP	Number	Mean gain in score	SD	Mean difference	t	p
BaiCiZhan	16	16.000	5.22	0.69	0.534	0.601 ($p > 0.05$)
Bubeidanci	16	15.313	4.51			

Table 2. The comparison of the score increase of delayed post-test versus pre-test using two apps.

APP	Number	Mean gain in score	SD	Mean difference	t	p
Baicizhan	16	10.56	5.18	1.19	1.245	0.232 ($p > 0.05$)
Bubeidanci	16	9.38	4.29			

According to the results, neither immediate post-test nor delayed post-test showed significant difference in word memory effect of participants. However, by comparing the average of the two post-tests with the average of the pre-tests, both apps showed an increase. In order to further confirm the conclusion, Tables 3 and 4 compare the average results of the immediate post-test of the two apps with the average results of the previous test ($p < 0.0001$) and delayed test results compared to the previous test average ($p < 0.0001$), and the results showed significant differences. Therefore, it can be concluded that the two app have significantly in improving word memory retention.

Table 3. The comparison of the average scores of immediate post-test versus pre-test using two apps.

APP	Test	Number	Mean score	SD	Mean difference	T value	p value
Baicizhan	Pre-test	16	10.38	6.05	-16.00	-12.271	0.000 (p<0.001)
	Immediate	16	26.38	4.53			
	Post-test						
Bubeidanci	Pre-test	16	10.94	4.91	-15.31	-13.573	0.000 (p<0.001)
	Immediate	16	26.25	4.02			
	Post-test						

Table 4. The comparison of the average scores of delayed post-test versus pre-test using two apps.

APP	Test	Number	Mean score	SD	Mean difference	T value	p value
Baicizhan	Pre-test	16	10.38	6.05	-10.56	-8.162	0.000 (p<0.001)
	Delayed	16	20.94	6.46			
	Post-test						
Bubeidanci	Pre-test	16	10.94	4.91	-9.38	-8.746	0.000 (p<0.001)
	Delayed	16	20.31	5.41			
	Post-test						

There are three factors influencing vocabulary learning effectiveness.

(1) Diverse Learning Styles. Different individuals have different ways of learning. This kind of difference is called learning styles⁷. Moreover, learning styles are considered as biological in nature, which determines that the same learning strategy may be good for some people while bad for others⁸. Furthermore, learning styles are considered relatively stable and difficult to manipulate. As participants responded to the first interview question, 7 of the 16 participants rated BaiCiZhan as having a better effect on their word memory, while 8 participants rated Bubeidanci as having a greater effect. The other one thought that the two apps have the same effect, because she used methods other than learning strategies included in two apps.

(2) Using Image. Neuner (1992) believes that some words in the vocabulary field are easier to master, store, extract and activate than others, because these words can create quite clear visual features in our brain⁹. This is consistent with one of the findings of the study. In the pre-test, none of the participants knew the word 'cosmic', but after learning with BaiCiZhan, most of the learners could answer the word '宇宙的' when filling out the Chinese translation. Their answers in the interview also showed that it was because the pictures provided by BaiCiZhan were of a universe and the visual features of the word were very clear that they could clearly remember the word. However, several participants were unable to correctly recall whether the word was a noun or an adjective, suggesting that pictures were not a good indicator of the word's part of speech.

In addition, according to the dual coding theory, concrete words or phrases are easier to remember than abstract ones because concrete words evoke images. Images, on the other hand, can be dual-encoded in the brain with words that enhance or reinforce memory. One of the examples in this study is, all 16 participants gave the Chinese translation of 'iridium' correctly. Some suggested that when they filled in the Chinese translation, what came to mind was the picture that matched the word, a pen nib. One respondent even mentioned that he was impressed because he knew that the tip of the pen was made of the metal iridium. It proved that for a specific noun, "iridium", the meanings of words can be well combined with images and have a significant effect on memory improvement.

However, images sometimes cause misleading for learners. According to Underwood (1989), pictures are easier to remember than words on the premise that words and pictures are closely related¹⁰. If this premise is violated, the use of

images will cause confusion in the learner. For example, in the word ‘stagnant’, BaiCiZhan shows a stagnant pool on the left and compared with water in a flowing river on the right. However, the definition of ‘stagnant’ is ‘water or air is not moving therefore smells unpleasant’. The mismatching leads to participants’ failure to recall: “*When I was shown the word ‘stagnant’, I could only remember there was a lake in the picture*”.

Taylor (1986) points out that visual stimulation is not always successful and can have considerable ambiguity in the interpretation of meaning¹¹. In other words, the meaning of words is not always conveyed well by pictures; Conversely, the meaning that learners interpret from the pictures does not always correspond to the meaning of the words themselves. Similarly, this phenomenon is supported by McCarthy (1990), who points out that not all words can be easily interpreted by visual stimuli, and that some visual stimuli can be misleading¹². He also emphasized that images are just a way of representing “denotation”, and that sense relation between the word and other words should be provided if a word is to be fully interpreted. In our selected apps, BaiCiZhan provides images and also identifies the synonyms and antonyms for target words.

(3) Learning Vocabulary within Context Sentences. There is no supposed conclusion that providing different context is more effective than providing pictures. Because a large number of studies have shown that even without sentence context, a large number of words can be learned in a short time and stored in memory for a long time, using word card learning strategy. This is also consistent with the results of Griffin’s (1992) experiment mentioned above¹³. In this experiment, participants who were observed watching context sentences carefully responded positively and supportively to the questions about Bubeidanci sentences, rated the sentences as helpful because they provide different contexts for a word. In contrast, participants who were observed not looking at context sentences carefully found the sentences less helpful. The same conclusion can be drawn from the study of Dempster (1987)¹⁴. He found there is no difference in effect between learning words by definition alone and combining definition with context sentences. He believes that although context makes no difference in the sense of recall, it provides knowledge of other aspects of a word, such as collocational knowledge. This means, perhaps because the experiment only asked participants to write down the meaning of the word, in the form of a Chinese translation, but if there were tests on other aspects of the word, such as how the word is used in a sentence, the validity of the context would come out.

5. SUGGESTION AND CONCLUSION

The most successful learners are those who actively use a wide range of vocabulary learning skills. Learners should learn to choose the most suitable one from a large number of word learning strategies, and also need to consciously switch from one learning skill to another according to the situation. Although learning styles appear to be fairly constant, teachers can alter the assignments they give their students in a way that would yield the best results. With time, it might also be able to encourage students with specific learning preferences to adopt strategies they had previously resisted adopting.

Through in-depth analysis of the word learning strategies of the two apps BaiCiZhan and Bubeidanci and interviews with participants, the influencing factors that affect the memory effect may include learners’ different learning style preferences, the advantages and disadvantages of using of pictures and context sentences. Further studies may need to involve more the participants and increase the number of target words to reach more representative conclusions and provide more useful information and suggestions for Chinese learners.

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