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An explorative study on media effects in vocabulary learning

ABSTRACT
This article deals with the best media or media adequate ways to memorize vocabulary. An empirical study is presented in which test persons had to memorize vocabulary in an unknown language in three different ways. Thus, three experimental groups were presented Hungarian vocabulary to be learnt. The first group learnt a vocabulary list from a sheet of paper, the second one from the computer monitor, but without any animation, and the third one from an animated flash file. In the present article, the results of this study are reported and discussed.
Keywords: Computer-based learning, amygdala, hippocampus, vocabulary

1. Introduction

The last few decades have witnessed enormous changes in language learning in terms of the applied methods and tools. Most of the current language learning and teaching methodologies have accepted digital media as a rich source of information and a powerful teaching tool. The significance of the digital resources has been changing together with the development of ICT and teaching methodologies, ranging from early enchantment to a more moderate evaluation and appropriate integration into the language learning/teaching process. The problem of an appropriate ratio of using digital and conventional media in the process of learning languages has been the focal part of the research.

Since the early days of introducing ICT into language studies, there has been an ongoing debate about the role and influence of technologies upon learning (Clark, 1994; Kozma, 1994; Reeves, 1998; McCombs, 2000; Nathan & Robinson, 2001, etc.). During the classical discussion about digital media, Clark (1994) claimed that learning was not influenced by media, rather by instructional methods and learner traits, while his opponent, Kozma (1994), suggested that a combination of

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media with methods in instructional research might influence learning, and the key question should be formulated as: "In what ways can we use the capabilities of media to influence learning for particular students, tasks, and situations?" (p. 18).

During the decades following the dispute, IC technologies have irreversibly entered the language learning/ teaching environment and brought new opportunities together with new methodologies oriented towards the learner and towards lifelong learning. Both theoreticians and practitioners have agreed that computer technology has the potential "to support diverse needs and capacities within the student population and to allow students greater control over their learning" (McCombs, 2000, p. 1). Teachers of foreign languages have acknowledged the benefits of computer-assisted language learning in developing communication skills, learners' responsibility and creativity. The unlimited availability of authentic materials, accessibility to multimedia applications, and communication capabilities have been quoted as the most rewarding features of CALL by Chun and Plass (2000), and other authors. Theoretical and practical support has been provided by special journals, such as Computer–Assisted Language Learning, Language Learning and Technology; scientific research conferences are regularly held and professional associations are organized; books by the leading experts in the area are published (Dudeney & Hockly, 2007; Sharma & Barrett, 2007; Thomas, Reinders, & Warschauer, 2012; Beatty, 2013, etc.).

However, with the increasing application of digital media in language studies, questions have arisen whether ICT is a panacea in developing different language skills, or whether some critical evaluation of the influence of computer technologies upon language learners' advancement should be carried out. Brandl (2002) states that

> there are numerous convincing arguments in favor of integrating Internet-based materials into a foreign language curriculum. At the same time, several arguments can be made that ask for a more cautious approach (p 154).

A number of researchers have studied differences between reading from screen and from paper (Brandl, 2002; Stepp-Greany, 2002; Wästlund, Reinikka, & Norlander, 2005; Ackerman & Lauterman, 2012; Park, Yang, & Hsieh, 2014, etc.), and found out that the use of technologies bring little or no improvement into reading comprehension efficiency. The experimental testing conducted by Mangen, Walgermo, & Brønnick (2013) lead to the following conclusion: "The main findings show that students who read texts in print scored significantly better on the reading comprehension test than students who read the texts digitally" (p. 61).

Mueller and Oppenheimer (2014) studied the peculiarities of note taking on laptops and agreed that the issue was controversial: although students believed that laptops brought benefits, professors considered that using a laptop in class impaired performance. Research proved that laptops were disturbing and resulted in students' poor concentration on the classwork.

An increasing attention has been given to the possibilities of enhancing efficient vocabulary learning because

> The mastery of vocabulary plays a key role in the whole process of the second language learning and is of critical importance to the learners. Without a solid mastery of vocabulary, listening, reading, translation and writing are all attics in the air (Rasekh & Ranjbari, 2003, p. 123).

Learning new words requires a lot of individual work and time, therefore language specialists search for ways how to facilitate the task. Dalton and Grisham (2011) have proposed various strategies for learning foreign language vocabulary, understanding that "improving students' vocabulary is an area of urgent need if we are to develop the advanced literacy levels required for success in school and beyond".

Khatib, Hassanzadeh & Rezaei (2011, p. 144) claim that one of the fastest growing areas with respect to vocabulary learning has been the studies on Computer Assisted Vocabulary Learning (CAVL). One major advantage of CAVL is that learners can control and direct their own learning (Pavičić, 2008). Lateron, different ways of applying computer-based means have been developed for learning vocabulary online, from compiling glossaries of specific terms (Mullamaa, 2010), introducing a variety of learning strategies (Dalton & Grisham, 2011), to creating a special e-portfolio system (Tanaka, Yonesaka, & Ueno, 2015). However, Mullamaa (2010) also admits that

> E-learning tends to create dissenting opinions. Some educationalists appreciate its values, others tend to be rather reserved to the option of having the electronic environment (p. 40).

The same concern is expressed by Dalton and Grisham (2011):

> Although the pervasiveness of ICTs in all aspects of 21st-century life is quite clear and well accepted, it is less clear how teachers might successfully integrate technology into literacy instruction and specifically vocabulary instruction (p. 1).

In addition to different attempts to develop computer-based tools and approaches for learning vocabulary, attention is also given to the learners' perception of digital media in the learning process. In an experimental pilot study at Saarland University, I aimed at determining students' abilities to learn vocabulary with different media (Giessen, 2011). Different student groups were learning vocabulary from a computer screen and from paper. Having analyzed the findings of the experiment, the result was that "vocabulary remembrance was strikingly worse when learning from the computer screen in comparison with learning the classical way, from the paper sheet" (Giessen, 2011, p. 325).

2. The experiment

The aim of this paper is to present an explorative, larger follow-up study. In this experiment, conducted with university students, three experimental groups were formed, the first of which was confronted with the vocabulary to be memorized in the traditional way (vocabulary lists in paper form), the second group in the form of a static vocabulary list on the computer, while the third group had to memorize vocabulary on an animated computer screen with a Flash document, the vocabulary replaced from mother to target language in a fading process.

Since the vocabulary to be learned should come from a language that uses the Latin characters, but whose lexis should be presumably unknown, the choice fell on Hungarian. The vocabulary to be learned came from the field that would be of interest during a touristic visit in order to get a certain acceptance that learning was not entirely for learning's sake, but could have some added value. Within 30 minutes, a list of ten words had to be memorized. While we tried to get as many students as possible to take part in the experiment, we were keen in ensure a balance of the major social variables sex and age.

During an introductory phase of some 15 minutes the students were informed about the experiment. However, the specific question of the experiment was not revealed in order to avoid negative influences. It was important that the students of all groups received the same amount of time – 30 minutes – to memorize the individual lexis. A first review of the memorization took place immediately after the learning period, that is, after or after switching off the computer. A second check was made the following day and a third check exactly one week later. For querying the memorized vocabulary a maximum of 15 minutes was calculated. It is important to note that the time intervals between the phases of learning and interrogation were identical in all three groups.

Table 1: Vocabulary list German / Hungarian / English

German	Hungarian	English
auf Wiedersehen	Búcsú	Good bye
Bitte	Kérem	please
Danke	Köszönöm	Thank you
Entschuldigung	Bocsánat	sorry
Ferien	Ünnep	holidays
Guten Tag!	Jó napot kívánok	Hello!
die Mahlzeit	az étkezés	meal
das Restaurant	az étterem	restaurant
Tschüss!	Viszlát	Bye!
die Übernachtung	az éjszaka	accomodation

3. Results

3.1 Results vocabulary learning from paper sheet

The performance was the same for short-term and medium-term retention (Ø 9.4 points or 94%). The highest score was 10 points (full score) for both the short-term and the medium-term retention test. The lowest value was 3 points for the short-term retention test and 7 points for the medium-term retention test. However, comparing the short-term and medium-term benefits, it has to be noted that only 9 participants took part in the medium-term retention test (instead of 22 in the short-term test and 19 in the long-term retention test).

Average retention performance was lowest in the long-term retention test (Ø 6.9 points and 64%, respectively). The minimum and maximum values were similar in the long-term retention test (maximum: 10 points, minimum: 4 points) as in the short-term retention test (maximum: 10 points, minimum: 3 points).

Table 2: Results vocabulary learning from paper sheet

short-term retention:	
Number of participants:	22
average retention (in points):	9,4
highest score:	10,0
lowest score:	3,0
medium-term retention:	
Number of participants:	9
average retention (in points):	9,4
highest score:	10,0
lowest score:	7,0
long-term retention:	
Number of participants:	19
average retention (in points):	6,9
highest score:	10,0
lowest score:	4,0
in percentages:	
short-term retention:	94,0%
medium-term retention:	94,0%
long-term retention:	64,0%

3.2 Results vocabulary learning from computer monitor (without animation)

The average retention was comparably high in all three evaluations (short-term retention: 83.57%, medium-term retention: 86.47%, long-term retention: 80.59%). Nevertheless, the retention was lowest in this test constellation (computer: without animation) in the area of long-term retention. The maximum values achieved by participants were 100% (10 points) in all retention ranges. The minimum

values were 30% (3 points – short-term retention), 40% (4 points – medium-term retention) and 30% (3 points – long-term retention).

Regarding short- and medium-term retention, the retention of those learning the vocabulary from paper sheets was higher; only long-term retention scored higher here, however (also) with weaker lower scores. It must be noted that the number of participants in the test for medium-term (17 participants) and long-term retention (8 participants) was well below the number of participants in the short-term retention test (28 participants).

Table 3: Results vocabulary learning from computer monitor (without animation)

short-term retention:	
Number of participants:	28
average retention (in points):	8,3
highest score:	10,0
lowest score:	3,0
medium-term retention:	
Number of participants:	17
average retention (in points):	8,6
highest score:	10,0
lowest score:	4,0
long-term retention:	
Number of participants:	8
average retention (in points):	8,1
highest score:	10,0
lowest score:	3,0
in percentages:	
short-term retention:	83,57%
medium-term retention:	86,47%
long-term retention:	80,59%

3.2 Results vocabulary learning from computer monitor (with animation*)*

Retention is lowest in short-, medium-, and long-term retention compared to all other test settings. Interesting seems to be the observation that this (learning from the computer monitor with animation) was the only setting where long-term retention was higher – if only slightly – than medium-term retention.

Table 3: Results vocabulary learning from computer monitor (without animation)

short-term retention:	
Number of participants:	33
average retention (in points):	6,9
highest score:	10,0
lowest score:	2,0

medium-term retention:	
Number of participants:	14
average retention (in points):	4,7
highest score:	8,0
lowest score:	0,0
long-term retention:	
Number of participants:	23
average retention (in points):	4,8
highest score:	8,0
lowest score:	1,0
in percentages:	
short-term retention:	69,39%
medium-term retention:	47,14%
long-term retention:	47,83%

4. Conclusion

Due to the loss of participants from the first date (with the learning phase and the testing of short-term retention) and the further tests, participation numbers are so divergent that an inferential statistical review seemed pointless. The results should therefore be considered with caution.

The classical vocabulary list on a paper sheet was most successful in the overall context of the experiment. Thus, we can assume that vocabulary presented on paper leads to a higher level of attention than items presented on the screen.

However, we did not observe a sincere decline in memorizing when using the computer screen (without animation). It might be that vocabulary read on the computer monitor is less thoroughly received and hooks at a lower level of processing depth. The computer medium thus seems to favour a certain degree of volatility in information processing. However, only animated computer presentations seem to lead to evidently worse results in short-, medium- and long-term retention. Computer animations thus seem to lead to inhibitions of the retention process. In any case, it could be shown that, in the context of vocabulary learning, it makes sense to dispense with animated computer presentations.

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