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Screen vs Paper in  
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# Screen vs Paper in Foreign Language Learning

## Kompiuterio ekranas ar popieriaus lapas mokantis užsienio kalbų

STUDIES OF FOREIGN LANGUAGES / SVETIMŲJŲ KALBŲ STUDIJS

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### Abstract

Foreign language learning/teaching has undergone major changes since the advent of digital media as a tool for language studies. New technologies offer efficient ways for retrieving information, facilitating communication and enabling distance learning. In many cases, ICT get integrated into didactics; language courses are based on blended learning, and online resources become an integral part of the learning process. These changes give rise to methodological questions how and when digital resources should be used and whether they could replace the conventional means. The paper presents an overview of an ongoing discussion related to the role of digital media in language learning/teaching, and learning vocabulary in particular. An experiment conducted at Kaunas University of Technology to determine whether computers help students to learn new words is described and the findings of the experimental study are analyzed. A follow-up survey disclosed the students' preferences and needs when learning new vocabulary, reading texts or doing writing tasks. The respondents' answers serve as a background for the methodological recommendations how to make language studies more efficient by an appropriate blending of digital and conventional media in the learning process.

**KEYWORDS:** language learning, conventional media, digital media, ICT integration, vocabulary learning.

### 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.

Language specialists at Kaunas University of Technology have been pioneers among Lithuanian higher schools in using ICT for language teaching/ learning, and have been searching for the best ways of integrating new technologies into language courses based on blended learning. Both theoretical and practical seminars have been held for the faculty, a number of European projects have been dedicated to ICT application in teaching languages, and



the efficiency of computer-assisted language learning (CALL) methods has been tested for over a decade. **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 vocabulary plays an essential role in mastering a foreign language, **the aim** of the present paper is to study the efficiency of digital media in learning vocabulary, compared to the traditional way of learning from a paper sheet. For this purpose, a series of experiments was carried out with students of Kaunas University of Technology who were divided into two groups, one learning a list of new words from a sheet of paper, the other one – from the computer screen. The paper presents the findings and analyzes the implications. The follow-up survey answers disclosing the students' preferences are discussed.

**The methods** used were theoretical studies, experimental teaching and surveys.

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 media with methods in instructional research might influence and benefit 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?" (Kozma, 1994, p.18)

During the decades following the dispute, ICT 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 et al, 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". A number of researchers have studied differences between reading from screen and from paper (Brandl, 2002, Stepp-Greany, 2002, Wästlund et al, 2005, Ackerman & Lauterman, 2012, Park et al, 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 et al. (2013, p.61) 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".

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,

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## Scientific literature analysis

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 & Ranjbary, 2003). 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 (2013) 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 (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). Recently, 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 et al, 2015). However, Mullamaa (2010, p.40) 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". 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" (Dalton & Grisham, 2011, 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. Of special interest in this aspect is Giessen's (2011) experimental study aimed at determining students' abilities to learn vocabulary with different media. In his study, the author experimented with two student groups, testing the learning outcomes when learning vocabulary from a computer screen and from paper. The experiment was carried out in Saarland University, Germany. Hungarian was chosen as the target language, a list of ten basic words needed for the first encounter with native speakers (hello, please, thank you, etc.) was selected. The two parallel groups learning this 'survival' vocabulary in different ways were tested after the learning session, a day later and in a week's time. Having analyzed the findings of the experiment, the author concluded 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).

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## The experiment

In the research conducted by Giessen (2011) and Mueller (2014), the authors argue that despite the obvious tendency to assume that media-based learning is more efficient, the traditional learning from paper proved to be more productive and preferred by learners. In order to check the arguments and conclusions, we decided to conduct a similar experiment with students of Kaunas University of Technology where foreign language courses are based on blended learning, a substantial part of tasks is done on the Moodle platform, so students are used to both conventional and digital means in their studies.

The aim of the research was to analyze vocabulary acquisition in two different ways – traditionally from paper and by showing the list of words on the computer screen during the weekly class in the computer lab. The vocabulary to be learnt was presented as a list of

isolated words and their translation, taking into consideration that “de-contextualised vocabulary learning is a fully legitimate strategy” (Lewis, 1996, p.35).

The experiment on memorizing unknown vocabulary was conducted with first- and second-year KTU students taking a course in English at the upper-intermediate level. Different groups of students took part in it during four terms - autumn terms of 2013 and 2014, and spring terms of 2014 and 2015. In each session, the two types of experimental groups were tested simultaneously (overall, 8 academic groups participated during the period), and in most cases those were students of the same faculty, taking the C1 level English course.

Firstly, following the idea proposed by Giessen (2011), the students of KTU were given a list of 10 survival words in an unknown language, in our case it was Finnish vocabulary (see Appendix 1). The selection of the language had to guarantee that the meaning of the words could not be easily predicted, therefore no Germanic or Romanic language was chosen. It was also decided not to include languages which are characterized by other than the Latin alphabet (e.g., Arabic or Russian). The languages that contain specific characters, such as Romanian or Polish, were excluded as well. It is true that the Finnish list contains umlauts, but they were considered to be of no big problem to the Lithuanian learners since many of them are familiar with German to a lesser or greater extent. Finnish is an agglutinative language that is characterized by long-word forms; however for our purpose, short words which could be practical in use were chosen. Possibly, they could be used in travelling or communication with people in Finland or in Estonia since relationships with these two countries are traditionally popular in Lithuania.

**The procedure of the experiment:** as in Giessen’s experiment, the students were given an academic hour, or 45 minutes, to memorize the listed words. Afterwards the vocabulary was read out in Lithuanian in a random order and the two groups – one learning from paper and the other from the computer screen - were asked to write down the learnt words. The vocabulary acquisition was checked three times: first, immediately after the learning session in the class during the allotted 45 minutes, next - in a day’s time, and finally in a week’s time. The responses were considered correct only if all the ten words were reproduced correctly.

The results of learning the Finnish words were quite poor, as shown in Table 1. However, even when experimenting with the Finnish vocabulary, the findings showed a higher percentage of fully memorized words in the group learning from paper rather than the computer screen.

The feedback from the students in the form of a questionnaire revealed that they did not learn the vocabulary satisfactorily since it was not motivating, too unnecessary or too foreign.

Therefore, in the following stages of the experiment, the list of Finnish words was replaced by unknown academic vocabulary related to the students’ English studies, thus hoping to increase their motivation. Although students usually have quite good spoken language skills and can communicate fairly well, at the University they face a challenge of developing academic literacy which involves abstract notions, advanced problem solving tasks and specific vocabulary. Considering the aims of the university language studies, the words for the experiment were selected from the glossary of the Academic English course, taking into account their low frequency of occurrence, thus making sure that students are not familiar with them.

1 <sup>ST</sup> DAY RESULTS			
FROM PAPER	CORRECT	FROM SCREEN	CORRECT
19 respondents	7 (36.8%)	22 respondents	7 (31.8%)
2 <sup>ND</sup> DAY RESULTS			
FROM PAPER	CORRECT	FROM SCREEN	CORRECT
7 respondents	3 (42.8%)	14 respondents	4 (28.5%)
IN A WEEK’S TIME			
FROM PAPER	CORRECT	FROM SCREEN	CORRECT
17 respondents	5 (29.4%)	11 respondents	3 (27.2%)

**Table 1**

Outcomes of learning  
FINNISH vocabulary  
(AUTUMN 2013)

## Results and discussion

During the three following terms, vocabulary acquisition of six different academic groups was tested with the selected list of ten academic words (see Appendix 2). The number of the respondents varied a little on the second day or during the test in a week's time because of their attendance, and the proficiency level differed due to the fact that students in some faculties have better foreign language learning skills (e.g., School of Economics and Business compared with the Faculty of Mechanical Engineering and Design).

The findings of the experimental testing using the academic vocabulary are shown in Tables 2, 3 and 4. Since the students' numbers in the experimental groups were not identical, the results are calculated in the percentage of correct answers for easier comparison.

Despite the differences in the numbers and abilities of the participants, the findings of the experimental testing show that in most cases the percentage of well-memorised and correctly reproduced words was higher among those who were learning from paper than those who used the computer, thus confirming Giessen's hypothesis. In some cases (Table 3), the initial

result was slightly more satisfactory in the computer-assisted group (45.4%, versus 42.1% of those who were learning from paper), however, the long-term memory did not work well, and in a week's time 40% of students learning from paper could still reproduce all the ten words, compared to 33% of the parallel group learning from the computer screen.

The authors are definitely aware that learning isolated words has serious limitations, and the new vocabulary has to be presented and drilled in a variety of different contexts. As Lewis (1996, p.55) argues, "learning is a process and the true learning comes from continuous relationship between experience and the reflection of that experience which gets finally internalized". However, the aim of the present experiment was to check what factors influence the learners' memory and what methods of learning should be used to facilitate the process. Judging by the experimental testing findings, vocabulary learning is an individual process that each learner organizes in his/her particular

**Table 2**

Outcomes of learning  
ACADEMIC vocabulary  
(SPRING 2014)

1st DAY RESULTS			
FROM PAPER	CORRECT	FROM SCREEN	CORRECT
11 respondents	6 (54.5%)	12 respondents	5 (41.6%)
2ND DAY RESULTS			
FROM PAPER	CORRECT	FROM SCREEN	CORRECT
8 respondents	3 (37.5%)	10 respondents	3 (30%)
IN A WEEK'S TIME			
FROM PAPER	CORRECT	FROM SCREEN	CORRECT
10 respondents	3 (30%)	10 respondents	2 (20%)

**Table 3**

Outcomes of learning  
ACADEMIC vocabulary  
(AUTUMN 2014)

1st DAY RESULTS			
FROM PAPER	CORRECT	FROM SCREEN	CORRECT
19 respondents	8 (42.1%)	22 respondents	10 (45.4%)
2ND DAY RESULTS			
FROM PAPER	CORRECT	FROM SCREEN	CORRECT
18 respondents	7 (38.8%)	18 respondents	6 (33%)
IN A WEEK'S TIME			
FROM PAPER	CORRECT	FROM SCREEN	CORRECT
15 respondents	6 (40%)	18 respondents	6 (33%)

**Table 4**

Outcomes of learning  
ACADEMIC vocabulary  
(SPRING 2015)

1st DAY RESULTS			
FROM PAPER	CORRECT	FROM SCREEN	CORRECT
43 respondents	35 (81.3%)	31 respondents	13 (41.3%)
2ND DAY RESULTS			
FROM PAPER	CORRECT	FROM SCREEN	CORRECT
38 respondents	20 (52.6%)	27 respondents	7 (25.9%)
IN A WEEK'S TIME			
FROM PAPER	CORRECT	FROM SCREEN	CORRECT
37 respondents	18 (48.6%)	29 respondents	7 (24.1%)

way, usually without the help of the computer. In order to test this hypothesis, a follow-up questionnaire was distributed, asking all the participants to answer two essential questions: about the usual way of learning vocabulary and the difficulties in the experimental learning. The learners could mark several relevant options if needed. The results of the survey are summarised in Table 5 (in percentage).

As can be seen from Table 5, the majority of the respondents use a sheet of paper or a notebook for learning new words, a certain number of them claim that it does not matter what way they choose (from 6.2% to 26.3%), and only a relative minority (from 6.2% to 15.8%) learn words from the computer

screen. Making notes and rewriting the words was pointed out as a popular method in learning vocabulary (from 34.2% to 51.9%).

When evaluating the difficulties of the experimental vocabulary learning, about one third of the respondents marked lack of time as an obstacle, which is hard to believe since an academic hour should be sufficient for memorizing ten words. A more realistic factor causing difficulties is lack of concentration (reaching the peak of 72.7% in the survey of spring 2015) and lack of motivation marked by a significant percentage of the learners (from 23.3% to 44.7%). However, only a small part of the respondents considered the experimental learning to be an unusual practice (from 6.2% to 11.6%), therefore it may be concluded that the influence of external circumstances was insignificant.

It should also be noted that students were given an option "other" for both questions in Table 5, in anticipation of some individual approaches; however, there was not a single entry for those options, therefore "other" was deleted from the table above. It can be assumed that in acquiring vocabulary our learners typically make use of the listed techniques and have the same difficulties as indicated.

In summarizing the findings of the experiment, it can be concluded that students prefer learning vocabulary from paper rather than the computer screen, and the efficiency could be increased by enhancing students' concentration skills and motivation.

In order to get a wider view of students' favourite ways of learning a foreign language, two more questions were included in the questionnaire about reading and writing. The responses show that a paper book is mostly preferable in doing reading tasks (approved by over 90% of students), while in writing approximately the same percentage of respondents are in favour of hand writing and producing a Word document. Further studies in the area will be continued in the future.

WHICH IS YOUR USUAL WAY OF LEARNING VOCABULARY?			
OPTIONS	Spring 2014	Autumn 2014	Spring 2015
NUMBER OF RESPONDENTS	16	38	77
1. from a vocabulary in your notebook	3 (18.7%)	9 (23.7%)	33 (42.8%)
2. from a list on a paper sheet	11 (68.7%)	17 (44.7%)	41 (53.2%)
3. from the computer screen	1 (6.2%)	6 (15.8%)	6 (7.8%)
4. by making notes/rewriting words	8 (50%)	13 (34.2%)	40 (51.9%)
5. it does not matter, I use different ways	1 (6.2%)	10 (26.3%)	9 (9.1%)
WHAT WERE THE DIFFICULTIES IN LEARNING VOCABULARY?			
OPTIONS	Spring 2014	Autumn 2014	Spring 2015
1. lack of time	5 (31.2%)	14 (36.8%)	29 (37.6%)
2. lack of concentration	3 (18.7%)	15 (39.5%)	56 (72.7%)
3. lack of motivation	7 (43.7%)	17 (44.7%)	18 (23.3%)
4. unusual way of learning	1 (6.2%)	3 (7.8%)	9 (11.6%)

**Table 5**

Preferences and difficulties in learning vocabulary.



## Conclusion

Computer-assisted language learning has irreversibly become a dominating tendency in foreign language studies, and new technologies are highly appreciated due to the accessibility of unlimited authentic resources, intercultural communication possibilities, enhanced learner autonomy and responsibility. However, a number of studies have shown that it is not always reasonable to rely on the computer, especially in organising reading comprehension tasks and learning new vocabulary. The experiment conducted by the authors of the present paper at Kaunas University of Technology was to test the efficiency of learning vocabulary in two different ways. The findings confirm the conclusions of Giessen's study that learners memorise new words from paper better than from the computer screen.

It is obvious that the empirical study has been carried out on a small scale and needs further development. Yet, the experiments and surveys have indicated that digital media are counter-productive in learning vocabulary, although very effective in problem solving, communication tasks or search for information.

## Appendix

### Appendix 1. Finnish vocabulary

	Finnish	Lithuanian
1	Hyvästi	Sudie, viso gero
2	olisitko kiltti	prašau
3	kiitos	ačiū
4	anteeksi	atsiprašau
5	hyvää päivää	laba diena
6	matka	kelionė
7	ateriat	valgis, valgymas
8	ravintola	restoranas
9	näkemiin	iki pasimatymo
10	jäädy yöksi	pernakvoti

### Appendix 2. Academic vocabulary

	English	Lithuanian
1	Infirmity	trūkumas, negalia
2	Quintuple	penkiagubas
3	Moiety	pusė, dalis
4	Remit	kompetencija, atsakomybė
5	Subsidence	nuslūgimas, nukritimas
6	Prerequisite	prielaida, būtina sąlyga
7	Detrimental	žalingas, nustolingas
8	Exacerbate	(pa)bloginti, (pa)sunkinti
9	Plummet	kristi, sumažėti
10	Disparity	skirtumas, nelygumas

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### Romualda Marcinkonienė, Jūratė Zdanytė. Kompiuterio ekranas ar popieriaus lapas mokantis užsienio kalbų

Užsienio kalbų mokyme ir mokymesi įvyko daug pokyčių, susijusių su skaitmeninių mokymo įrankių taikymu. Naujosios kompiuterinės technologijos (NKT) padeda efektyviau rasti informaciją, palengvina komunikaciją, leidžia vystyti nuotolinį mokymą. NKT buvo integruotos į didaktiką, kalbų mokymas remiasi mišriuojamu mokymu, o interneto ištekliai tapo neatskiriama mokymo dalimi. Šie pokyčiai išskėlė metodologinius klausimus: kaip ir kada tikslinga taikyti skaitmenines priemones ir ar jos gali pakeisti tradicines priemones. Straipsnyje apžvelgiama aktuali specialistų diskusija apie technologijų

## Santrauka



vaidmenį mokant(is) kalbų, ypač mokantis žodyno. Aprašomas Kauno technologijos universitete atliktas eksperimentas, skirtas nustatyti, ar kompiuteriai padeda studentams mokytis naujų žodžių ir analizuojami eksperimentinio mokymosi rezultatai. Pateikiami studentų apklausos atsakymai apie jų pasirinkimą mokantis naujų žodžių skaitant tekstus ar atliekant užduotis raštu. Respondentų atsakymai suteikia pagrindo metodinėms rekomendacijoms, kaip padidinti kalbų mokymosi efektyvumą tinkamai parenkant skaitmenines ir tradicines priemones.

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