

## ***READING EFFICIENCY IN BLENDED LEARNING CONTEXT***

**by Aleksandra Szymańska**

Public Lower Secondary School in Żelazna, Poland

**& Alicja Wujec Kaczmarek**

Teacher Training College in Opole, Poland

ale.szymanska @ gmail.com, alicjawuka @ gmail.com

### **Abstract**

This article describes the experiment investigating the issue of reading efficiency in blended learning context. The study aimed to find out whether reading efficiency is higher when reading from a printed material or from a computer screen and if the effectiveness of reading depends on the attitude towards a text presentation format. The research aimed to inform the teachers that the blended component introduced into the learning English not only does not impede the learning process but improves it by influencing the attitude. The effectiveness of reading was measured in the terms of recall and comprehension of the texts presented in two different modes. The findings show that there is no significant difference as far as recall results are concerned when two delivery modes are applied though the experiment participants obtain higher comprehension results while they deal with electronic texts. The attitude study showed that the participants seemingly born as digital natives prefer reading from a printed material to reading from a computer screen.

### **Introduction**

The development of IT skills has become a real life necessity required by institutional, educational and work environments. The need of technology has already been utilized by present-day educators who attempt to make the process of learning more efficient and successful for the contemporary learners. The implementation of new technologies for pedagogical purposes required the emergence of new educational approach that includes the use of technological devices as the didactic tools. Such an approach is often referred to blended learning, which was defined by Graham (2005) as a learning system that “[combines] face-to-face instruction with computer-mediated instruction” (para. 6). Out of several skills that can be developed in all types of environments including BL, reading appears to be crucial. As implied in Longman (1992), reading is “perceiving a written text in order to understand its contents” (p. 306). Since reading is inseparably connected with comprehending a given text, we have to be aware of the processes taking place during it. The lower- and higher-level processes are commonly cited by the researchers of reading as the ones that fully explain the process of understanding a read text (Grabe and Stoller, 2002; Kintsch & Rawson,

2007; Piasecka, 2008). In view of the fact that reading in the BL context takes place in both environments – the traditional, that is from a sheet of paper, a book or a course book, and from a computer screen, both conditions have to be inspected to look into reading efficiency in those contexts.

In order to measure reading efficiency, not only comprehension of the text read but also its recall has to be measured and examined. As Dillon (1992) implies, comprehension and recall are the outcome measures which may provide the researcher with the wider picture of how the reader correlates with the text. When it comes to reading comprehension, which is understanding and interpreting the text (Grabe and Stoller, 2002), it can be checked with the use of a multiple choice questionnaire, which is, as some researchers assert (Dillon, 1992; Koda, 2005), the most appropriate tool to measure such a phenomenon. *Recall*, on the other hand, can be defined as the process of reminding oneself information stored in one's memory and, as Koda (2005) affirms, “[t]here is a general agreement that free recall is the most straightforward procedure for assessing the outcome of reader-text interaction” (p. 236). Bearing in mind these considerations, the existing literature investigating reading in the blended learning field should be carefully examined.

### **Review of literature**

The literature concerning the issue of interest revolves mainly around the outcomes of reading the traditional text along with an electronic one and then comparing the results. Most previous research in this field turned out to be inconclusive as there was no proof that one or the other delivery mode gives better outcomes, which is, in fact, a favourable result for the blended learning emergence.

The research conducted by Mutter and Maurutto (1991) consisted of two experiments. The former experiment aimed at proving that there is no difference in speed and comprehension when two different delivery modes are considered. The latter one dealt with reading in both delivery modes. The first experiment, as well as the second one, supported the hypothesis that the type of delivery mode has no impact on the efficiency of reading. What is of paramount importance, is that the reader must remember that this particular study was conducted in early 1990s and was preceded by trials that proved computer to be a poorer medium producing weaker results when reading is concerned. Consequently, an experiment conducted under the same conditions but with the use of more developed hardware may result in different outcomes. Thus, a study conducted in more up to date conditions was carried out by Kol and Scholnik (2000). In this experiment, the results of skimming and scanning from a

piece of paper and from a computer screen were compared and showed no significant differences, too. The subsequent experiment performed by Kerr and Symons (2006) aimed at measuring reading efficiency by means of reading time, free recall, cued recall, as well as inferential comprehension. Paper conditions proved to be better when reading speed as well as inferences skills were concerned. Nevertheless, free recall outcomes were higher in the case of the electronic version. What is more, there was no significant difference in cued recall and comprehension when reading from two different delivery modes. The last research is the one done by Askari Arani (2004), who designed a quasi-experiment to investigate whether it is better to use current internet-based articles or the traditional course books when learning a language. This study concentrates on the question whether it is appropriate to use the current articles from the Internet to teach English. It also aims at clarifying the issue of attitude towards the delivery modes. Askari Arani's (2004) quasi-experiment proves the Internet-based articles to be superior to the traditional ones. The author of the study ascertains that students who are interested in and satisfied with the materials used during learning are more involved in what happens during lessons. Moreover, the articles found on the Internet offer authentic and up to date materials, which are found more attractive by students of English. Besides, the students who are given the Internet-based materials are more likely to search through the Internet on their own and to learn autonomously.

Kol and Schcolnik (2008) had investigated previous studies on reading from the printed material and screen, and ran their own study aimed at comparing reading in both modes. In the pilot study it turned out that the participants scanning and skimming from paper and screen did the task better skimming from the paper. In the second study, students reading from paper and screen did the tasks equally well which can suggest that the readers, who are taught the necessary strategies, can perform the task similarly in both modes.

Concluding, we may assume that the researches existing in the literature prove the process of reading in BL context to be as efficient as reading in the traditional formats.

### **Design of the study**

Bearing in mind the results of the previous studies, the authors assumed that it would be interesting to test out the reading in BL context of Polish students. Moreover, the authors believe that the reading in BL context brings similar results to reading in the traditional formats will encourage the educators to use the computer and the Internet as a source of reading materials.

The main aim of the study is to find out whether the delivery mode has any effect on reading efficiency. Thus, the formulated hypothesis states that H - Reading efficiency is higher when reading from a computer screen.

To examine the issue the authors came out with the following research questions:

1. Is reading efficiency higher when reading from a piece of paper than when reading from a computer screen?
2. Does reading efficiency depend on mode of text presentation?
3. Does the effectiveness of reading depend on the attitude towards a text presentation format?

In the study, not only the superiority of one mode over the other has been taken into account but also the participants' attitude towards the delivery mode, which was examined with the use of a preference questionnaire. Therefore, the proposed hypothesis seems to be more testable, as it is confronted from more than one point of view.

The research took the form of an experiment, as "an experiment is concerned with studying the effects of specified and controlled treatments given to subjects usually formed into groups" (Seliger and Shohamy, 1989, p. 136). The experiment could take place as such conditions as random assignment and normal distribution in the experimental groups were satisfied. Moreover, as equal conditions were applied to the groups, the results could be measured according to the delivery mode application and thus, the influence of a given mode (a computer screen or a piece of paper) could be measured.

Thirty participants, 6 men and 24 women, who were all second-year students at the Foreign Language Teacher Training College in Opole, took part in the experiment. Due to the fact that they were all studying English, not only the English proficiency level was high but also their perception of language as such and their acquaintance with tests in their second language was adequate. What was also important was that all the students were familiar with computers being used when learning a second language as some of the courses took place in the computer laboratory and they participated in Information and Communication Technologies classes.

For the purpose of the study, the participants were randomly divided into two groups, first of which was called the experimental one, while the other constituted a control group. The experimental group was to read a text from computer screens, while the control group got the text in a paper version. In the article the groups were called according to the delivery mode they used.

Three reading tests were used to examine the generated hypotheses. The experiment started with a placement test which tested the general proficiency in reading in a second language. There were five tasks, all of which tested various reading skills, mainly: the ability to skim, scan, deduce the meaning from the context and to select relevant information from the text. It was a standardised test for testing the language knowledge for advanced learners taken from the book *Cambridge Certificate in Advanced English 4* (1999). The five tasks mentioned above, as well as the recall and comprehension test, can all be found as the attachments at the end of the article.

Then, the second stage of the experiment started with all the students answering a short attitude questionnaire which examined their preference for a given mode. Firstly, the participants were asked whether they prefer to read a text from a computer screen or from a piece of paper and then to specify why the given mode has been chosen as a more convenient one. The attitude testing part was actually divided into two, as the questionnaire as such was administered just at the beginning of the research while the oral part took place after performing the experimental task. The discussion, which involved all participants, was conducted for two reasons. First, not to let the participants use their short term memory in the recall stage and second, to obtain a response in many respects more spontaneous and abundant. Subsequently, their observations and remarks were noted down and together with the outcomes of the attitude questionnaire were studied and analysed.

In the next phase of the experiment, the participants were divided into two groups, first of which read a text from a computer screen, while the other was given a paper version of the text.

The focal point of the research was to read, recall and comprehend the text taken from the *Cambridge Certificate in Advanced English 6* (2005). The same text was given to the computer and the paper groups. The paper group got an A4 piece of paper so that the content was easily seen and the computer group got the text in a form of a PDF file. The PDF format was chosen as such text presentation type, is the most parallel to the traditional text.

Before the next phase, called by the authors 'the cramming session', the students were asked to read the text carefully as their task would demand to recall as many ideas and details from the text as possible. Subsequently, the paper group was to put away the texts, while the computer group switched off the monitors and both groups were asked to perform the task. Like in the previous stage, the students were given thirty minutes to recall the content of the read text. What is important is that they were to write their recall in their second language, which was due to their proficiency in English. Nevertheless, they were allowed to use Polish

words if they were unable to recall the English equivalents. After finalising the experimental task described above and completing the discussion on the attitude towards the modes, all students received a paper version of a comprehension test. The test comprised five multiple choice questions, which constituted the integral part of the text that the students had read and accordingly, was taken from the same book - *Cambridge Certificate in Advanced English 6* (2005).

By applying two comprehension measures (recall and comprehension test) the researchers received a wider picture of the way the text was memorised and comprehended by the experiment participants. The data collected were analysed with the use of SPSS 15; however, before being put into the software, they were examined by the researchers themselves.

After analysing the suggestions proposed by the contemporary researchers that deal with recalling (Alderson, 2000; Koda, 2005), the authors decided to divide the text into so called 'thought/idea units'. Such a task could only be accomplished with the help of other teachers of English, who were asked to read the text and mark the units, which were actually the pieces of a text that could be read with no pause. The quantity of thought units marked by the teachers differed; nevertheless, the authors chose the most common ones and eventually divided the text into 107 'thought units' and thus, 107 points could be gathered. When checking the recall answers, the idea was to highlight on a text what participants actually recalled and then compare it with the thought units division created by the authors. Very often the participants wrote only part of the 'thought unit' and in such a situation, the authors decided whether to give point or not on the basis of the meaning being conveyed in the given unit.

### **Data analysis and results**

As stated by Nunan (1992), the most important issue concerning numerical data is to find the extent to which the data are similar and different. These are the measures of central tendency and dispersion. The former consists of such values as the mean, which is the average number, as well as the median, which is defined as the middle point in a distribution. Dispersion is characterized here by standard deviation, which "provides a sort of average of the differences of all scores from the mean" (Brown 1997, p. 69). Using SPSS 15, descriptive statistics like mean, median and standard deviation were used to find the central tendency and dispersion in the scores gained by all participants in the placement test that took place at the beginning of the study.

Table 1. Placement test statistics

T-test for independent samples							
Placement test							
	N	Mean	Std. Deviation	Median	t	df	p
Computer group	15	28.07	4.82	28	0.84	28.00	0.52
Paper group	15	26.53	5.17	27	0.84	27.20	0.52

The descriptive statistics shown in the table indicate that there is a difference between the computer and paper group when the mean is considered; however, the difference is not statistically significant.

It is important to remind that the research can be called an experiment only if two crucial conditions are satisfied. First of them is the random assignment, the other is normal distribution in groups already created. Group formation has already been described above, thus let us turn to the second condition to be met.

After calculating descriptive statistics, the authors proceeded to other computations. When examining the descriptive statistics in groups, Shapiro-Wilk test was calculated. Since significance level was higher than 0.05 (in this case  $p=0.87$ ), normal distribution was observed. Then, Levene's test which aims at testing the equality of variances, was applied. In the test, the significance level should be equal or higher than 0.05 to observe the homogeneity of groups. In this case,  $p=0.55$  and accordingly, there was an equality of variance. After the normal distribution and homogeneity of variance were examined, the  $t$ -test for the equality of means was calculated. Since  $p=0.41$ , one may assume that there is no statistical difference between the groups. Summing up, since the placement stage satisfied already described conditions, the authors may call their research a true experiment.

### Attitude

The data from the attitude questionnaire revealed a general tendency to read from a piece of paper rather than from a computer screen. Only three students out of thirty (10%) prefer reading from a computer screen to reading from a piece of paper. Those who prefer reading

from a computer screen justified their choice by saying that it is “more joyful and faster”. Moreover, they favour reading from a computer screen because in this condition the text can be adjusted and manipulated. They also gave an example of the materials they use when studying which are very often in bad condition and it is hard to read the photocopy of them. In the case of scanned materials, they can zoom it to the point that it is possible to see the text.

When it comes to the participants who prefer reading from a piece of paper, the justifications of such a choice are rather common. Many of them (37% of participants) assumed that reading from a piece of paper is less tiring than reading from a computer screen. The second mostly shared opinion (27%) was that the book can be taken anywhere, while it is rather hard to say it about a computer (even a laptop computer). The third mostly shared opinion (20%) was that it is much easier to make notes on paper than with a computer. The other views related mainly to the text navigation. The participants claimed that it is hard to locate the information on a computer screen, while it is much easier when a paper mode is considered. Some of the students declared to be lost in a computerised format and they added that the text on a paper is more “reader-friendly”. They also agreed that it is easier to scan a paper version of a text as one can adjust the position of a sheet of paper and write on it. Generally, those who prefer the traditional, that is the paper text, have a wider range of arguments than those who prefer reading from a computer screen. Nevertheless, not taking into account the mode preferences, the participants were assigned in random manner to groups reading a text either from a piece of paper or a computer screen. The first phase of examining the effectiveness of such a reading was to be verified in a recall test, the results of which are presented beneath.

### **Recall**

After the attitude questionnaire had been conducted, the students were given a text and were supposed to remember as many details as they could. Afterwards, they were to recall the information from the text in a written form. There were 107 units to be recalled. The results of the recall protocols are presented in Table 2.



Table 2. Recall test statistics

T-test for independent samples						
Recall test						
	N	Mean	Std. Deviation	t	df	p
Computer group	15	40.33	12.64	0.66	28.00	0.52
Paper group	15	37.00	15.03	0.66	27.20	0.52

With the use of the SPSS program, the authors compared the mean scores of the computer and paper group by carrying out a *t*-test for independent samples. Even though a difference between the groups may be observed, there is no significant difference between the groups according to the *t*-test. The other statistical observations include such aspects as the homogeneity of groups. Since the standard deviation is lower in computer group, this group is, as the recall statistics show, not only better, but also more homogenous.

### Comprehension

In contrast to earlier group statistics, comprehension test statistics are to be examined with the use of nonparametric tests, as no normal distribution was observed. A Mann-Whitney test was chosen to compare the outcomes of the comprehension test in both computer and paper groups.

Table 3. Comprehension test statistics

T-test for independent samples						
Placement test						
	N	Mean	Std. Deviation	Mean rank	Sum of ranks	Asymp. Sig. (2-tailed)
Computer group	15	4	0.9	19.5	292.5	0.01
Paper group	15	3	1.0	11.5	172.5	0.01

There were five points to be gained from the multiple choice comprehension test. After examining the table, one may gain the impression that the computer group did slightly better, as their performance mean equals 4, while it is only 3 in the paper group. In fact, as mean ranks are taken into account when Mann Whitney test is applied, the first impression is confirmed, since the computer group's mean rank is much higher than the other group's. The other issue concerns the 2-tailed asymptotic significance, which equals 0.01 and being smaller than 0.05 mean suggests the difference between groups. Consequently, the difference between the computer and paper groups when comprehension of a text is considered actually exists.

### **Comparison of group performance**

When reflecting upon the computer and paper group performance, one may observe a great similarity between both groups. Nevertheless, even though mainly not statistically significant, the computer group did slightly better in most stages of the study. Moreover, this group was statistically better when the comprehension test is considered.

When it comes to the recall test, if one was to judge the amount of units that could have been brought to mind, one would assume that the results were rather low; however, to fully accept such a statement one should juxtapose the results with other studies concerning recall. Even so, it is hard to compare such a research with the others as there have been different texts chosen for other studies. In such a case, the only thing that is certain is that the groups performed on approximately same level. Thus, we can draw a conclusion that the delivery mode does not matter when the effectiveness of reading is considered.

The comprehension test was the only phase of the experiment that confirmed the hypothesis which assumed the superiority of the computer mode over the traditional one when dealing with the text understanding.

### **Discussion**

To begin with, the results shown in this chapter are comparable to the ones presented in the section concerning the research in the given field (Mutter and Maurutto, 1991; Kol and Schcolnik, 2000; Askari Arani, 2004; Kerr and Symons, 2006). It appears that research on the effectiveness of reading, when two different delivery modes are concerned, is inconclusive, given that in many cases there is no statistical difference between the groups' performances.

Considering the first research question on the superiority of traditional mode of reading the answer turns out to be inconclusive, as in none of the stages the paper group did

surpass the computer group. Nevertheless, some of the empirical studies portrayed in literature review present the evidence for such a situation.

The answer to the second research question is challenging. On one hand, there is no statistical difference when recalling a text from a paper and from a computer format, but on the other hand, the computer group's results proved to be better. Thus, it does not matter what mode has been used when we recall the text, but it becomes significant when we comprehend it. Nevertheless, one may not assume that reading from a computer screen is equivalent to reading from a piece of paper. It results from the fact that not only the techniques used for reading in each mode, but also the attitude towards them, differs.

The importance of attitude has been already stressed in some of the contemporary studies (e.g. Askari Arani, 2004), as some of the researchers claim that the lessons conducted with the use of computers (or other technological devices) provide the learners with greater motivation than the regular classes. As already mentioned, positive attitude may result in more effective language acquisition. The influence of attitude was taken into consideration on the stage of designing a study. But unfortunately, there were not enough participants in the experiment to find the extent to which the attitude to a given delivery mode corresponds to the way the students perform. There were only three students out of thirty who found the computer screen a more convenient mode used for reading.

Even though the hypothesis was not confirmed at all stages of the experiment, it is significant that the computer group performed more successfully in all experimental tasks; however, their superiority was statistically significant only in comprehension task. Moreover, the groups performed at a similar level, which means that the computer does not constitute a substantial obstacle when comprehending and recalling a text and that is why the issue of attitude towards a delivery mode has been so much emphasised by the author of the thesis.

As in the case of the empirical studies described above, the results of the experiment conducted by the authors seem to be inconclusive, since it is impossible to claim a superiority of one delivery mode over the other. Nevertheless, when analysing particular stages of the researcher, the main findings may be summarised as follows:

- the participants of the experiment prefer reading from a piece of paper to reading from a computer screen;
- there is no significant difference as far as recall results are concerned when two delivery modes are applied;
- the experiment participants obtain higher comprehension results while they deal with electronic texts.

### **Implications for the EFL classroom**

The contemporary literature and the authors' experiment show that the use of texts in an electronic format does not interfere with reading efficiency. At least when the text resembles paper version and the only modification is that it is read from a computer screen. Hence, the use of computers and the Internet appears to be fully justified as far as reading in a blended learning context is concerned.

Moreover, the Internet provides the readers/learners with constantly updated materials with real-life vocabulary in variety of fields (e.g., legal, economic, technical, academic, computer jargons), which makes the process of reading and learning more attractive, motivating and valuable. Whatever the materials the learners need are, they are available in a 'click' of a mouse and usually free of charge. The additional advantage of reading in such an environment is the fact that it is rich in multimedia which provides the learners with greater amount of more varied stimuli. Consequently, in this kind of environment the learners of different learning styles are able to gain more relying on various multimedia aspects. The use of visual but also auditory input makes the read material more meaningful and thus easier to remember and later, to retrieve it (Brown, 2000). The learners working in multimedia surrounding develop ICT skills looking for reading texts, doing the research, taking notes etc. which equips them in the abilities necessary in their future academic, professional and everyday life. And as Krajka (2007) claims, "Learners autonomy is essential in the Internet-based classroom, where the learner is frequently in charge of the choice of materials, evaluation of their own progress, selection of learning strategies" (p. 194). Most of the learners are quite familiar with ICT technologies as they have been a part of school curricula and this group enjoys the use of computers and the Internet with its wide range of possibilities. On the other hand some of the students from the other side of 'the digital divide' fear or feel discomfort facing the challenges the modern technology brings and they have a chance to overcome it by practice and concentrating on the task itself.

### **Suggestions for further research**

Since the blended learning context and its implications into the process of learning a foreign language is a relatively new trend in methodology, its nature has not yet been fully investigated. Consequently, the BL context as such requires careful further studies. The authors suggest some specific areas to be looked into.

The blended learning researchers cited in the article concentrated only on the reading the text from paper and from a computer screen in formats that are similar to each other. The next stage would be to examine reading efficiency in the hypertext environment in order to check other electronic formats and their usefulness for educational purposes. It would be interesting to know what learning/reading strategies are used by the learners while using different formats such as paper texts, electronic linear texts and hypertexts and to what extent reading effectiveness may be influenced by the format of a given text.

Due to the fact that there were only few students who preferred reading from a computer screen to reading from a piece of paper, the researchers could not investigate the subject of attitude influence over the effectiveness of reading in a given mode. Thus, such an issue is also worth inspecting in future research.

The authors believe that the next intriguing aspect of learning in a BL context may be the relation of technology and language fear which can impede or improve the process of foreign language learning.

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