

READING COMPREHENSION: STATISTICAL ANALYSIS OF TEST RESULTS FOR PRIMARY AND SECONDARY SCHOOLS

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***Summary** - The aim of the study was to determine any possible differences in reading skill achievement with regard to the number of English lessons per week, final school grade in English, learning English outside school, learning other foreign languages and using the Internet. Reading comprehension was tested in the eighth grade of primary school (on a sample of 1254 learners) and in the fourth grade of secondary school (on a sample of 656 learners). Results have shown that the number of English lessons per week has a positive influence on the reading skill achievement scores for secondary school learners, while no such trend is observable for primary school learners. There was a mild to moderate correlation between the overall English grade and the achievement on the reading comprehension test. Learning English outside school had a positive influence on the reading comprehension achievement score in primary school, which was not the case for secondary school learners. Finally, using the Internet was positively correlated with the reading skill in primary school learners.*

***Keywords:** primary school, reading comprehension, secondary school*

1. Introduction

There are several significant issues related to the reading skill in L2 (Grabe, 2002): (1) purposes for reading, (2) definitional criteria for fluent reading, (3) individual processes in reading, (4) social factors that influence reading, (5) some specific issues in L2 reading (in comparison with reading in L1), and (6) applying research results and implications to improve L2 instruction.

The primary purpose for reading in L2 is understanding a text. Any discussion of reading must necessarily include its dual nature: reading is, on the

one hand, a comprehension process in the learner's mind, but it is also a product (Alderson, 2000). Although the process of reading has always been of interest to researchers from various fields, its intricacy has led to research which is based on analyzing the products of reading. In other words, conclusions about the processes in the learner's mind are based on comprehension as the outcome of reading.

Definitional criteria for fluent reading in order to achieve a general comprehension of the text include several elements: (a) speed and automaticity, (b) interaction with the text, (c) reading strategies and flexibility, (d) reading as a purposeful activity, and (e) reading as a linguistic process (Grabe, 1999). Fluent reading is a rapid process which includes the ability of automatic word recognition. Furthermore, reading is interactive and consists of numerous abilities and skills which are activated automatically and simultaneously. The interaction is also present on a higher level of comprehension, and is characterized by a relationship between the information in the text and the reader's background knowledge. During reading, readers continually assess whether they are achieving the purpose of reading, in other words they are reading strategically and adapting their activities with regard to the set goals. As we mentioned, the purposeful nature of the process refers to text comprehension. However, every reader also monitors her progress with regard to more immediate expectations, e.g. whether the task is sufficiently interesting to go on reading. Finally, reading is a linguistic process in which the reader constructs meaning and comes to a particular understanding of the text through linguistic processing.

The third significant issue refers to individual processes or levels that make up the reading skill. According to Adams (1990) lower level comprehension processes include rapid and automatic word, structure and sentence recognition. Higher level processes are connected with structuring information and text interpretation on the basis of the reader's background knowledge, aims and attitudes (Grabe, 1999; Kintsch, 1998).

The issue of social factors which influence the development of the reading skill is of central concern for this paper. Numerous studies have shown that the reading skill is influenced by a variety of social factors connected with the family, the home and place of residence, the school and other educational institutions, peer and teacher influence, etc. Various social factors influence how and how much we read and contribute to our reading habits, our attitude to reading and motivation for reading. In case of L2 reading this complex issue is further complicated by factors connected with cognitive and affective transfer from L1. Our complete linguistic knowledge and attitudes towards L1 necessarily influence the development of the reading skill in L2. When we begin reading in L1, we typically have considerable knowledge of the vocabulary (roughly 6000 words) and basic grammatical structures (cf. Grabe, 2002). In contrast, L2 reading starts without such background knowledge, and the key to successful reading is learning vocabulary (so as to be able to quickly recognize a large number of words),

employing reading strategies, being familiar with textual elements and genres and being able to distinguish them, and having a motivation for reading in general. L1 knowledge and its transfer have been proven to influence the development of the L2 reading skill (cf. Durgunoglu and Verhoven, 1998; MacWhinney, 1997; Nagy et al., 1997). The transfer may be positive, but it may also cause serious difficulties in the reading comprehension process.

Finally, another issue that is of central importance in research of the L2 reading process is applying research results in order to improve L2 instruction. Regardless of the type of research and of variables under investigation, one of the essential questions that a researcher must be able to answer is whether her results can be used as the basis of further research and/or to improve existing methods and strategies of reading instruction, and if so how. Before describing the test used in this research project, we need to say a few words about the variables which influence the nature of the reading process, relating them to this research.

1.1. The reader and the text

Studies of the reading process are traditionally divided into two groups (Alderson, 2000): (1) those that deal with reader variables and (2) those that deal with various aspects of the text. Since this paper deals with reader variables, we will list some basic reader variables and describe those that we consider most significant for the interpretation of the results. There are several basic reader variables: (a) reader's background knowledge, (b) reader's motivation and reasons for reading, (c) reading strategies, (d) stable characteristics such as gender and age and (e) physical characteristics such as speed of word recognition, processing automaticity, etc.

Reader's background knowledge is the most important variable for this paper. The reader must above all possess knowledge of the language. Carrell (1983) distinguishes linguistic knowledge and knowing linguistic conventions from the so-called knowledge of the world. Linguistic knowledge includes being familiar with the specific characteristics of various genres and the organization of various texts. Some authors also distinguish background knowledge as a component of the knowledge of the world which is not relevant for the comprehension of a particular text. In addition to background knowledge, the knowledge of the world includes specific knowledge connected with the content of the text, in other words subject matter or expert knowledge. All of these types of knowledge are reflected in the levels on which we understand the text, i.e., whether, as Gray (1960) put it, we are reading the lines, reading between the lines or reading beyond the lines. Some authors refer to this as the levels of understanding the text (cf. e.g. Kintsch and Yarbrough, 1982). Regardless of how we choose to describe the knowledge of the world it is inseparable from the linguistic knowledge and necessary for any understanding of a linguistic structure, including understanding creating while interacting with a written text. Thus, understanding a text requires appropriate knowledge

of the world, whose organization is described in terms of categories, schemes, scripts and frames by various authors (Cook, 1991; Alderson, 2000; Schank and Ableson, 1985; Lakoff, 1987; Taylor, 1995). These structures enable the reader to process new information and integrate it into existing cognitive models.

Although this paper will not deal with the relationship between motivation and achievement on the reading test (for details on this relationship see J. Mihaljević Djigunović this issue), it should be mentioned that the second most reader's variable is her motivation and the reasons for reading. Research into reading, both in L1 and L2, have shown that poor readers lack motivation for reading and are not interested in reading (Cooper, 1984). Moreover, some research (e.g. Fransson, 1984) has shown that internal motivation (as opposed to external motivation) directly affects understanding of the main ideas in a text and making connections between them, as well as connecting the text with other texts, subject matter knowledge and knowledge of the world in general.

2. The aim of the study

The aim of the study was to determine any possible differences in reading skill achievement with regard to the following learner/reader variables: the number of English lessons per week, final school grade in English, learning English outside school, learning other foreign languages and using the Internet.

3. Research method

3.1. Sample

A total of 1910 learners participated in this part of the study. There were 1254 primary school students and 656 secondary school students who took the reading comprehension test. Among primary school students who declared their gender there were 556 boys and 694 girls. A total of 258 boys and 361 girls declared their gender among secondary school participants (for more detailed data about the sample see the paper about research methodology in this issue).

3.2. The instrument

3.2.1. Test structure

The reading comprehension test for the eighth grade of primary school consisted of a total of five tasks, each with eight, nine or ten individual items. The first item in each task (item listed as A) was solved, in order to clearly show to participants how they should fill in the test.

The first task of the primary school test consisted of 10 items (B-K), which required participants to match a noun with its definition. There was one more noun

than there were definitions. The second task consisted of ten items (B-K), and participants were required to match a sign with its explanation. There were a total of eleven signs and twelve explanations. The third task consisted of nine items (B-J) – questions and answers of a short conversation, and participants were required to identify the correct sequence. There was one more answer than was necessary. The fifth task was part of both reading tests. It consisted of ten advertisements. Each advertisement was missing one part. Participants were required to match each advertisement with the correct missing part (B-J).

The first task of the reading comprehension test in the fourth grade of secondary school consisted of ten items (B-K). Each item consisted of a question, and participants were required to find the correct answer among the answers offered on the basis of what they had read. The second task consisted of nine items (B-J), and participants were required to match questions with appropriate answers. The questions and answers were given in the form of an interview between a journalist and cameraman filming dangerous situations. The questions consisted of a single sentence, and the answers were more complex, each making up a shorter paragraph. There were a total of ten questions and eleven answers, i.e. a total of nine questions and ten answers to be matched because one item was used as example. The third task was the same as the fifth task in the primary school reading comprehension test. The fourth task consisted of ten items (B-K), and participants were required to match the titles of books with the appropriate description of the book's content. One extra description was given. The fifth task consisted of nine items (B-J). Each item consisted of three, four or five possible answers, only one of which was correct. All of the questions were related to the text that participants were required to read.

3.2.2. Metrical characteristics of the test

There was a total of 46 items on the primary school reading test, and a total of 47 items on the secondary school reading test. Each correct item was scored as one point; thus the maximum number of points in the two tests corresponds to the number of items. The lowest score achieved by primary school learners was 20 points, and the highest score was 46 points (i.e. the maximum number of points). The lowest score achieved by secondary school learners was 0, and the highest score was 46. The fact that no participants achieved the maximum number of points is connected with the item 1K, which does not, in fact, have a correct answer.¹ The average score on the primary school test was $M_{ps}=34.12$ ($sd_{ps}=8.59$). The average score on the secondary school test was $M_{ss}=23.17$ ($sd_{ss}=13.39$). The facility value of the entire primary school test was $p_{ps}=.74$, which makes this test somewhat too easy.² The facility value of the secondary school test was $p_{ss}=.49$,

¹ A detailed analysis of this item showed that neither of the answers offered could be correct. The text which is part of this task does not give a single piece of information that would lead to the conclusion that one of the answers offered is entirely correct.

² The level tested by the primary school test was A2 according to CEFR (Common European

which shows that the facility value of the test was excellent. The reliability of the primary school test using Crombach's alpha coefficient for this sample is $\alpha_{ps} = .93$, and the secondary school test reliability is $\alpha_{ss} = .96$. Both tests are of satisfactory reliability, and it is indicative that all tests measure the same thing – the reading skill in the English language.

4. Results and interpretation

4.1. Differences in achievement with regard to the number of English lessons per week

In the analysis of achievement with regard to the number of English lessons per week two (extreme) groups of participants were taken into consideration – learners who took four or more English lessons per week ($n=27$) and those who took two or less than two English lessons per week ($n=62$) (Table 1a). The largest group of students (students with three English lessons per week; $n=1165$) was not taken into consideration in the analysis because of a difference in the size of the groups and the logical basis for such a comparison. Primary school learners showed no significant difference in achievement scores on the reading comprehension test with regard to the number of lessons per week ($t=.58$; $p>.05$). It should be noted that the number of participants making up the two groups was rather small in comparison with the overall number of participants in the study. If we compare the number of participants who took English more than four hours per week with the total number of participants (i.e. 1254 for the reading comprehension test) we can see that this number is very low, which is also true of the number of participants who took English less than two hours per week (27 participants for the reading comprehension test). Thus, we can conclude that the number of participants who took four or more English lessons per week and the number of participants who took two or less than two English lessons per week is too small to enable us to make a generalized conclusion that the number of L2 lessons per week does not influence achievement, including overall knowledge of the language and particular skills.

Table 1a: Significant differences in achievement on the reading comprehension test with regard to number of English lessons per week – primary school

lessons per week	n	M	sd	t	p
2 and less	62	37,87	6,22	,58	>,05
4 and more	27	36,93	8,75		

Framework of Reference for Languages), and the results of the reading test and its facility value show that Croatian primary school learners are above this level.

Table 1b: Significant differences in achievement on the reading comprehension test with regard to number of English lessons per week – secondary school

lessons per week	n	Arithmetic means across homogenous tests- Scheffe (Alpha =.05)	F	p
2 hours	182	19,42	15,08	<,05
3 hours	377	25,35		
4 hours	68	26,60		

In the analysis of secondary school learners' achievement with regard to the number of English lessons per week three groups of participants were taken into consideration – those who had four (or more) English lessons per week (n=68), those who had three English lessons per week (n=377) and those who had two English lessons per week (n=182). As opposed to primary school learners, there is a significant difference in achievement for the reading comprehension test (F=15.08). Scheffe's post hoc test was used to test for differences between the group which has two English lessons per week and the remaining two groups (Table 1b).³ The achievement of the two-hour-per week group is poorer than the achievement of the remaining two groups. This enables us to conclude that the number of English lessons per week in secondary school may be connected with the development of the reading skill. The logical conclusion is that learners who take more English lessons per week clearly have a greater opportunity to acquire linguistic knowledge and become familiar with the conventions of L2, and it is also reasonable to assume that more lessons per week enable learners with more opportunities to practice reading. Thus, we can conclude that these are the so-called practiced readers who, according to research (e.g. Cooper, 1984) have much better knowledge of the vocabulary, are better at understanding semantic relations between particular words and the meaning of conjunctions, and exhibit a higher ability of constructing meaning based on the context. It can be assumed that practice has contributed to better results.

4.2. Achievement and the overall English grade

In this analysis the English grade was treated as an interval variable (which is most common in practical analyses), which resulted in correlations between the English grade and the achievement on the reading comprehension test. Primary school learners showed a moderately significant correlation between the overall English grade and achievement on the reading comprehension test ($r_{ps} = .57$; $p < .05$). In other words, a higher grade meant better achievement on the reading comprehension test, which means that the school grade in English is a relatively good indicator of knowledge for this skill.

³ There was no significant difference between the group of learners who take three English lessons per week and those who have four or more English lessons per week.

Correlation analysis was also used to determine the relationship between the overall school grade and achievement on the reading test for secondary school learners. There was a mild significant correlation between the overall English school grade and achievement on the reading comprehension test ($r_{ss} = .31$; $p < .05$). Thus, we can conclude a higher English grade meant somewhat better achievement on the reading comprehension test, which makes the school a reasonably adequate indicator for this skill.

These results show that it is important to develop the reading skill, but do not indicate the reasons for this. Of course, a desirable conclusion would be that this serves a confirmation of the complex nature of the reading skill which, just like the overall school grade, consists of various components; and that the development of these components (as parts of the overall grade) automatically means developing the reading skill. Although this common-sense conclusion is possible, it can be confirmed or disputed only based on further research into the influence of the reading skill on the overall English grade. For example, one of the things to look into would be whether the difference between the results for primary and secondary school learners is connected with systemic factors related to the components of the overall grade (e.g. a difference in the share of the reading skill grade as part of the overall English grade) or with some other factors. Only this type of analysis would enable us to come to more definite conclusions.

4.3. Differences in achievement with regard to learning English outside school and learning another FL/L2

Learners who took additional English classes outside primary school had higher achievement scores on the reading comprehension test than learners who did not ($t=3.52$; $p < .05$). However, it should be noted that there is a relatively small number of learners who took English outside school. In the reading comprehension test, there were 1086 participants who took English exclusively at school, and only 109 learners who also learned English outside school (Table 2a).

Table 2a: Differences between groups in achievement on the reading comprehension test with regard to learning English outside school – primary school

learning English outside school	n	Mean	sd	t	p
no	1086	34,04	8,44	-3,52	<,05
yes	109	36,71	7,44		

Table 2b: Differences between groups in achievement on the reading comprehension test with regard to learning English outside school – secondary school

learning English outside school	n	M	sd	t	p
no	525	23,96	12,98	1,85	>,05
yes	24	18,92	15,69		

There is a significant difference in achievement between learners who took another FL/L2 and those who took only English ($t=5.67$; $p<.05$). A total of 323 participants reported learning another FL in addition to English, and their achievement scores speak in their favor (Table 3a).

Table 3a: Differences between groups in achievement on the reading comprehension test with regard to learning another FL (yes/no) – primary school

learning another FL	n	M	sd	t	p
no	931	33,35	8,69	-5,67	<,05
yes	323	36,32	7,91		

Table 3b: Differences between groups in achievement on the reading comprehension test with regard to learning another FL (yes/no) – secondary school

learning another FL	n	M	sd	t	p
no	208	21,67	11,76	-2,83	<,05
yes	308	24,85	13,65		

In addition to English, German is the second most common FL, followed by Italian. There is a significant difference in achievement on the reading comprehension test between the groups of learners learning German, Italian or another FL ($F=26.48$; $p<.05$). The results of post hoc tests show that learners who took Italian and learners who did not take any other FL have the same achievement scores. In contrast, learners of German had higher achievement scores on the reading comprehension test than the other groups (Table 4a). Despite these differences, we should be careful when drawing conclusions, because a lot of factors that need to be taken into consideration. We cannot claim with certainty that German (i.e. learning German) has a bigger influence on English achievement than other foreign languages, but these results can serve as guidelines for further research. However, we can assume that learning German, particularly its complex morphology and syntax, has a positive influence on the development of meaning construction strategies.

Table 4a: Differences between groups in achievement on the reading comprehension test with regard to learning another FL – primary school

learning another FL	n	Arithmetic means across homogenous tests- Scheffe (Alpha =.05)	F	p
no	931	33,35	26,48	<,05
Italian	93	35,19		
German	155	38,50		

Table 4b: Differences between groups in achievement on the reading comprehension test with regard to learning another FL – secondary school

learning another FL	n	Arithmetic means across homogenous tests- Scheffe (Alpha =.05)		F	p
Italian	77	20,42		7,17	<,05
ne	208	21,67	21,67		
several languages	34	23,06	23,06		
German	186		26,82		

There is no difference in achievement scores between secondary school students taking additional English classes outside school and those learning English exclusively at school ($t=1.85$; $p>.05$). However, it should be noted that relatively few students took additional English classes outside school. A total of 525 participants/learners took English only at school, and only 24 of them took additional English classes outside school (Table 2b). There is a significant difference in achievement between secondary school learners who learned other foreign languages and those who did not take any other languages apart from English ($t=2.83$; $p<.05$). Secondary school learners who learned another foreign language had higher achievement scores on the reading comprehension test than those who did not (Table 3b). There were 308 participants who stated that they took another FL and 208 who stated that they learned only English. Moreover, similarly to primary school, learners most frequently learned German (186 participants), followed by Italian (77 participants). A group of 34 participants said that they learned several foreign languages. There is a significant difference on the reading comprehension test between these groups ($F=7.17$; $p<.05$). Learners of German had higher achievement scores on the reading comprehension test than learners of Italian (Table 4b). As noted earlier, we cannot claim that learning German has a stronger influence on learning English than other foreign languages, but our results clearly show that learners of German are more successful. Again, it can be assumed that learning German broadens their knowledge of grammatical structures, and affects readers' general level of practice.

4.4. Differences in achievement with regard to using the Internet

Primary school learners showed a difference in reading comprehension achievement between groups formed on the basis of how frequently they use the Internet ($F=57.81$; $p<.05$). Scheffe's post hoc test showed that all three groups were different from each other: those who stated they never used the Internet, those who stated they used the Internet seldom, and those who said they used it often (Table 5a). Learners who never used the Internet had poorest achievement results, those who used the Internet seldom had somewhat better results, and those who used the Internet often had the best results. However, like in other analyses,

there is no way of knowing which other factors may have influenced the differences present between these groups. These results indicate that the influence of the Internet on the development of the reading and understanding skill in primary school should be measured. Based on these results, the strongest claim we can make is that there are differences, but the attribution of the causes cannot be made more precise without further more detailed experimental research.

Table 5a: Differences between groups in achievement on the reading comprehension test with regard to Internet usage – primary school

Internet usage	n	Arithmetic means across homogenous tests- Scheffe (Alpha =.05)	F	p
seldom	369	30,60	57,81	<,05
never	360	34,54		
often	463	36,67		

Table 5b: Differences between groups in achievement on the reading comprehension test with regard to Internet usage – secondary school

Internet usage	n	Arithmetic means across homogenous tests- Scheffe (Alpha =.05)	F	p
seldom	193	22,07	2,86	>,05
never	82	22,44		
often	274	24,85		

Secondary school learners (Table 5b) showed no significant difference in the reading skill achievement scores between the groups formed on the basis of how frequently participants used the Internet ($F=2.86$; $p>.05$). One of the possible reasons for this is a generally high exposure of the secondary school population to English. A comparison of achievement scores between primary and secondary school learners with regard to using the Internet may indicate that the differences we found between groups of primary school learners may point to their more limited exposure to English outside school than in the case of secondary school learners. Secondary school learners' previous linguistic knowledge and their overall interest in music, films and other types of entertainment (very much connected with English speaking areas) necessarily has an influence on their interest for reading and creates ample opportunities for independent reading. In this case the Internet is just one of the possible sources of information enabling learners to practice reading comprehension. On the other hand, in primary school learners these interests are only beginning to develop, and their previous linguistic knowledge is not sufficient to prompt them to take up the challenge of independent reading. Thus, learners who are motivated to surf the Internet and who practice their reading skill in such a way have an important advantage over learners who do not. Even if we assume that Internet usage refers to searching only Croatian web pages, Internet

users are still exposed to variously structured texts, and can expand their knowledge of the world, including subject-matter knowledge, which can frequently be significant for the process of reading comprehension (cf. Alderson, 2000).

5. Conclusion

The results have shown that all the selected reader variables selected are relevant in studying the L2 reading skill. The results have shown that there are differences in achievement with regard to the following variables:

- a) The results show that more English lessons per week in school has a positive influence on the reading skill achievement scores for secondary school learners; no such trend is observable for primary school learners. The reason for this difference can be attributed to the fact that most primary school learners had three English lessons per week.
- b) There was a mild to moderate correlation between the overall English grade and the achievement on the reading comprehension test, and this correlation was higher for secondary school learners than for primary school learners. These results may point to the fact that there are more reading activities in primary school and/or that assessment in primary school includes more reading than in secondary school.
- c) Learning English outside school had a positive influence on the reading comprehension achievement score in primary school, while this trend was not observable in secondary school, primarily because of a small number of secondary school learners who took English outside school. Learning other foreign languages, especially German, had a positive influence on the reading skill both in primary and in secondary school learners. One should be careful in interpreting these results because the study did not control for other cognitive and social factors which may have a significant influence on the results.
- d) Using the Internet was positively correlated with linguistic knowledge exhibited by the learners in the reading skill. This result points to the conclusion that the role of the Internet in the process of L2 learning should be further investigated controlling for various cognitive and social variables.

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