

Reading Speed and Reading Comprehension in Adolescents

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Abstract

Reading is a complex skill that is acquired through learning. Although most children with typical development master the skill of reading in due time, it is known that a smaller number of children show difficulties in reading. The aim of this thesis is to examine the reading speed and reading comprehension of primary school-aged adolescents. We also tried to determine the number of adolescents with reading difficulties, through analysis of reading speed and accuracy of comprehension of the read text. The research sample consisted of 200 pupils of sixth, seventh, eighth and ninth grade of the "Milorad Musa Burzan" elementary school in Podgorica. Assessment of reading speed and reading comprehension was performed using the Three-Dimensional Reading Test.

The results showed that reading speed increases with age, so ninth grade pupils read the fastest, whereas seventh grade pupils read the slowest. In terms of comprehending what was read, the pupils of the eighth grade were the most successful, and the pupils of the seventh grade were the worst. Moreover, the results showed that there are no differences in reading speed and reading comprehension between boys and girls. It was concluded that in this sample there were a total of nine (4.5%) pupils with reading difficulties.

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Introduction

Reading is one of the basic skills that a child acquires during his upbringing and the child's academic success depends on this skill (Leaxy, 2017). Reading is a process on which not only the process of education is based, but also the whole life (Vladislavljević, 1991). Reading is a very important skill in life, and that is precisely why a person in the modern world would not be able to function without reading (Brinić, 2021). In the life of students, great importance is given to the skill of reading, and in this way they are basically trained to understand both personal and spiritual life (Milatović, 1996). Reading is a complex skill that involves different cognitive processes, related to word decoding, connecting them to their meaning and comprehension of the read text (Tan & Nicholson, 1997). The reading process does not only mean deciphering the written symbols, but also the reader's thinking about what he has read - about meaning, sense and connection to with what he has already read and what he knows (Alderson, 2000). Reading represents an analytical-synthetic process that contains several components, such as: perceiving letters (graphemes) as graphic signs, converting graphemes into a vocal presentation, correct pronunciation of sounds their recognition in words, connecting words in a sentence and comprehending the content of what is read (Vuković, 2018). The reading process begins with visual analysis, or with the extraction of the visual characteristics of symbols, in order for these characteristics to be processed through the phonological, lexical and direct way of reading (Vuković, 2016; 2019). When it comes to the phonological path, Vuković (2016) states that when using it, the characteristics by which letters are recognized are taken from the system of visual analysis to the representation of the letters, or to the graphic code or grapheme, and then the abstract identities of the letters become recognized and marked. Words are divided into letters, followed by grapheme parsing. Readers who are dependent on the phonic path have the ability to read non-words and words with regular phonological correspondence, but when reading orthographically irregular words, they will make many mistakes (Vuković, 2016, 2019). On the other hand, readers who are dependent on the direct or visual way, have access only to their own vision of words and read both regular and irregular words equally well; however, the interpretation of words that are pronounced the same but have different meanings can cause difficulties, because access to the lexical path is difficult (Vuković, 2016). When applying the lexical path in reading, a person is unable to read nonsense words aloud, words with inflectional and derivational structures are often misread (Vuković, 2016).

During adolescence, when children are expected to achieve a certain level of independence in learning and to develop critical thinking and logical reasoning, reading disorders can hinder their progress in these areas.

Although most children master the skill of reading without difficulties, there are a certain number of them who face difficulties in reading. If children do not master the skill of reading by the age of eight or nine, there is a high chance that these problems will continue in their further education (Čudina – Obradović, 2014). Milutinović and Vučković (2017) state that in initial reading, pupils may go through certain stages that do not necessarily represent indicators of reading disorders. Some of these processes are: spelling to oneself, half-voice when separating words, muttering during silent reading and pupils' focus on the reading technique, without overthinking the text contents. Although these processes are not necessarily the indicators of

reading disorders, they must be considered. The mentioned characteristics of reading are mostly found in children who developed speech late, who had difficulties in pronouncing some sounds, or children who do not have a developed auditory perception, i.e. the inability to distinguish voices, and their incorrect auditory representation of the voice is reflected both in reading and in writing (Vladisavljević, 1977). Also, another type of initial difficulty in reading, as well as in writing, is based on wrong visual perception. This type of disorder in reading manifests itself by replacing letters that have a similar shape, and when writing by tilting them to the opposite side - up or down (Vladisavljević, 1977). According to Zečić (2018), one of the main difficulties in working with children with reading disabilities is their weak motivation for practice. The author further states that these children, in addition to lack of motivation and persistence, avoid reading whenever possible.

Difficulties in acquiring the skill of reading are marked by the term developmental dyslexia. Developmental dyslexia is a disorder in reading learning in neurologically healthy children who have normal intelligence, preserved senses, adequate education and favorable social and cultural circumstances (Vuković, 2016). Some authors (Golubović, 2000) define dyslexia as a specific disorder in the development of reading ability despite the existence of normal intelligence, good vision and hearing, adequate motivation and other favorable conditions.

Given the fact that there is not much research on reading disorders in Montenegro, the main goal of this study was to examine the reading speed and reading comprehension of elementary school-aged adolescents, and to determine the number of pupils with reading disorders.

Research methodology

The sample included 200 pupils of the sixth, seventh, eighth and ninth grade of the Elementary School "Milorad Musa Burzan" in Podgorica. The research was conducted after obtaining the consent of the Ministry of Education, Science and Innovation of Montenegro. The criteria for the inclusion of the examinees in the sample were that the examinee attends sixth, seventh, eighth or ninth grade, that he has been included in the usual way of training to acquire reading skills since the beginning of education, that he has average or above average abilities. The criteria for excluding examinees from the sample were below-average intellectual abilities, visual impairment, hearing impairment and severe motor and physical impairment. Reading was assessed using the Three-Dimensional Test – The Great Storm in Britain. The test was constructed by the author Helena Sax (Kostić et al., 1983). The test is adapted to the Ijekavian dialect of the Serbian language. The text for the reading was printed in Latin script. Using this test, the reading speed and comprehension of the read text was assessed. Reading speed was measured with a stopwatch, i.e. the number of words read in one minute. Comprehension was recorded on a special paper, or the number of facts reproduced by the respondent during the paraphrasing was recorded. It is expected that the examinee will state a total of 10 facts found in the read text. The psychometric characteristics of the test for the Serbian population are not available.

Statistical data processing was done in the software package SPSS 24.0 (Statistical Package for the Social Sciences for Windows). The methods of non-parametric statistics were used considering the uneven distribution of data. The Kruskal-Wallis test was used to test differences between groups, and later the Mann-Whitney U test was used to examine differences between pairs of groups. The usual value of $p < 0.05$ was taken as the level of statistical significance of differences. Arithmetic means and standard deviations, minimum and maximum values were used to display average values. The data are presented in tabular and textual form.

Results

Table 1 shows the descriptive indicators of the Three-Dimensional Reading Test. Descriptive indicators include reading speed (the number of words read per minute and the number of factual data that examinees provide when paraphrasing the text they read, which indicate the level of comprehension of what they read). These descriptive indicators of the Three-Dimensional Reading Test represent its two reading-related dimensions: speed and reading comprehension.

When it comes to the first descriptive indicator - reading speed per minute, we notice that the pupils of the ninth grade read the fastest (AS=128.17; SD=24.13), then the pupils of the eighth grade (AS=118.35; SD=24.73), followed by the sixth (AS=102.27; SD=24.63), whereas the slowest readers were the pupils of the seventh grade (AS=96.97; SD=23.39).

Descriptive indicator or the number of the factual data stated during paraphrasing of the read text, which is the parameter for the comprehension of the read, had the highest values in the examinees group of the eighth grade (AS=4.72; SD=1.47), then in the group of the pupils of the sixth grade (AS=4.5; SD=1.34), followed by the ninth grade (AS=4.24; SD=1.31), whereas the smallest values were registered within the pupils of the seventh grade (AS=4.20; SD=1.21).

Table 1. *Descriptive indicators of the Three-Dimensional Reading Test*

School age	Reading speed/number of read words per minute		Number of factual data	
	AS	SD	AS	SD
Sixth grade	102.27	24.63	4.5	1.34
Seventh grade	96.97	23.39	4.20	1.21
Eighth grade	118.35	24.73	4.72	1.47
Ninth grade	128.17	24.13	4.24	1.31

In this research, the Kruskal-Wallis rank test was used to examine the difference between different age groups of the examinees. The results of the analysis show statistically significant differences between the groups of examinees in relation to their school age ($H = 43.519$, $df = 3$, $p = 0.000$). Mann-Whitney U tests were subsequently applied to determine specific differences between different pairs of groups. The results showed that there is a highly statistically significant difference between sixth and eighth grade pupils ($U=830,000$, $Z=-2,896$, $p=.004$),

then sixth and ninth grade pupils ($U=552,500$, $Z=-4,811$, $p=.000$) as well as seventh and ninth graders ($U=427,500$, $Z=-5,672$, $p=.000$), all of that regarding the first dimension of the Three-Dimensional Reading Test, reading speed expressed by the number of words read per minute, which we have shown in table number 2.

Table 2. *Reading speed compared to school age*

School age	mdn	IQR	Min	Max	Kruskal-Wallis	df	p
Sixth grade	107.05	41.50	46.40	138.53	43.519	3	.000
Seventh grade	96.13	37.41	44.02	139.51			
Eighth grade	120.00	29.90	45.51	174.44			
Ninth grade	129.04	24.83	63.22	181.15			

Table 3 shows the differences between the age groups regarding the Three-Dimensional Test that refers to the comprehension of the read text. The Kruskal-Wallis rank test was also used. The results obtained from this test show that there are no statistically significant differences between the examined groups or pupils of different grades when it comes to reading comprehension ($H = 3.714$, $df = 3$, $p = 0.294$).

Table 3. *Comprehension of the read text compared to the school age*

School age	mdn	IQR	Min	Max	Kruskal-Wallis	Df	p
Sixth grade	1.00	2.00	1.00	7.00	3.714	3	0.294
Seventh grade	3.00	2.25	.00	8.00			
Eighth grade	3.00	3.00	0.00	8.00			
Ninth grade	2.00	0.00	2.00	7.00			

By applying the Mann-Whitney U test, the differences in reading speed between examinees of different genders were examined, with the results of this test showing that there is no significant difference between boys and girls ($U=4697.00$, $Z=-.741$, $p=.459$), which is clearly seen in table 4.

Table 4. Reading speed compared to the gender

Gender	mdn	IQR	Min	Max	Man-Whitney U test	Z	p
Boys	112.81	38.89	44.02.	181.15	4697.00	-.741	.459
Girls	115.58	37.57	46.40	157.00			

Table 5 shows the results obtained using the Mann-Whitney U test, which also shows that there is no significant difference between boys and girls in terms of comprehension of the read text (U=4243.000, Z=-1.908, p=.056).

Table 5. Comprehension of the read text compared to the gender

Gender	mdn	IQR	Min	Max	Man-Whitney U test	Z	p
Boys	4.500	1	1	8	4243.000	-1.908	.056
Girls	4	2	0	8			

Table 6 shows the frequency of slow readers (children who have reading difficulties) in each grade. Namely, in the sixth, seventh and ninth grades, it was determined that two children in each category, or 3% of the total sample read slowly in relation to their age. The largest number of children with reading difficulties was observed in the eighth grade, three of them, or 1.5% of the entire sample. The total number of children who have reading difficulties in this study is nine, or 4.5% of the total sample.

Table 6. Slow readers frequency (children who have difficulties in reading) in each grade

Grade	Children with difficulties in reading	
	N	%
VI	2	1%
VII	2	1%
VIII	3	1.5%
IX	2	1%
Total	9	4.5%

Discussion

When it comes to reading speed, this research found that ninth graders read the fastest, followed by eighth graders, then sixth graders, while seventh graders are the slowest readers. When we talk about the dimension of reading that refers to the comprehension of what is read, this research showed that the highest values were achieved by pupils of the eighth grade, while the lowest values were recorded by pupils of the seventh grade.

By analyzing the results, significant highly statistical differences were found between sixth and eighth graders, then sixth and ninth graders as well as seventh and ninth graders regarding the first dimension of the Three-Dimensional Reading Test, i.e. reading speed expressed as the number of words read per minute. Namely, using the Mann-Whitney U test, a significant highly statistical difference was found between sixth and eighth grade pupils ($U = 830,000$, $Z = -2.896$, $p = .004$), which shows that eighth grade pupils read faster than sixth grade pupils. Also, an even bigger difference was observed between sixth and ninth grade pupils ($U = 552,500$, $Z = -4,811$, $p < .001$). In addition, the difference between seventh and ninth grade is also highly statistically significant ($U = 427,500$, $Z = -5,672$, $p < .001$), which shows that ninth grade pupils have significantly better reading speed, compared to seventh grade pupils. The obtained results show that reading speed increases with age. The observed jump in reading speed between sixth and eighth grade may be a result of cognitive maturity. Vuković et al. (2022) also found that reading speed increases significantly with school age, and the number of reading errors decreases. Our results also coincide with other research that showed that reading speed develops progressively during education, so that the number of words a pupil reads in one minute increases from class to class (Buzan, 2000). Comparable results are reported by Malušić (1998) with a precise indication of the number of words (33.62) read by first grade pupils in one minute, up to 147.43 words, which on average were read by eighth grade pupils in one minute. Also, the results of the previously mentioned research showed that pupils who attended all-day classes, and therefore did not have enough time to practice reading, read 5.67 words per minute slower than their peers (Malušić, 1998). Also, Aşıkcan and Bakkaloğlu examined the reading speed of 47 Syrian students in their study, and came to the results that show that the majority of students have a reading speed below 100 words per minute in all three types of texts: narrative, informative and poetic (Aşıkcan & Bakkaloğlu, 2023).

When the differences between age groups in terms of comprehension of the read text were compared, it was observed that there are no statistically significant differences between the examined groups of pupils of different grades ($p = 0.294$). This result may suggest that the ability to understand the read text may not be so related to age, or the class and that it may be conditioned by some other factors, such as individual pupils' abilities, level of motivation, previous knowledge or teaching methods. The research conducted by Kim et al. (2010) showed that the best indicator for reading comprehension is the speed with which the student reads at the beginning of learning to read. The results of our research are surprising given that, in accordance with the standard educational expectations, one might expect that pupils of older grades achieve better results in comprehending the read text. Vuković et al. (2022) came to similar findings in their research, bearing in mind the fact that the research was conducted with children of younger school age. The results of their study showed the presence of reading comprehension difficulties

in the majority of examinees who were included in the study, as well as the fact that no significant improvement in reading comprehension was observed in the period between the third and fifth grades. It is interesting that some researchers pointed out that level of the comprehension can depend on type of the text. For example, in their study, Hamzadayi and Batmaz came up with results that showed that the students were significantly more successful in comprehension of the narrative compared to the others types of printed text (Hamzadayi & Batmaz, 2022). Therefore, it would be valuable to more detailed explore this topic in the future research.

The results of our research showed that reading speed differs significantly among the age groups of pupils (older pupils read faster), but this is not directly related to the frequency of reading disorders. Also, the results showed that there are no statistically significant differences between age groups when it comes to comprehension of the read text, which also suggests that age is not a key factor in the frequency of reading disorders, even according to this dimension of reading. So, it can be said that reading difficulties are present in all classes, but that their number is not significant, nor is it concentrated in one age group.

Furthermore, it was examined whether there is a difference in reading speed between examinees of different genders. The results of our research showed that there are no significant differences in reading speed between boys and girls. Also, it was shown that there are no significant differences in comprehension of the read text between boys and girls. Similar results were obtained by Vuković et al. (2022), who found no statistically significant differences in reading ability between boys and girls in their research. These results coincide with the results of other studies, which also showed that gender does not affect the occurrence of developmental dyslexia (Milankov, 2016). Furthermore, Golubović et al. (2019) state in their research that gender is not a crucial factor for success in phonological awareness tasks, which are associated with reading. Contrary to these findings, certain studies (Popović, 2014) have shown that girls achieve a higher level of comprehension of the read text, in comparison with boys. Also, in a study conducted by Malušić (1998), it was shown that girls, aged from second to seventh grade, on average read faster than boys. Additionally, they make fewer mistakes while reading. Findings from certain studies of fourth graders also suggest that girls have better reading comprehension than boys (Kolić – Vehovec, et al., 2008). In her research, Brinić (2021) found data that also indicates a statistically significant difference between boys and girls in the second grade when it comes to comprehension of the read text. Namely, the girls from their sample showed a better comprehension of the read text. The author attributed the difference in comprehension of the read text between boys and girls to interest and motivation for reading. In their research, Oakhill and Petrides (2007) came up with results that showed that motivation is important for boys to understand the read text, while this is not the case for girls. In addition to reading comprehension, the author examined the pupils' reading speed, accuracy and fluency, and finally concluded that there was no statistically significant difference between boys and girls, although boys achieved slightly better results when it comes to reading fluency and speed, while girls were more successful in terms of reading accuracy. Therefore, the results of our research, as well as the results of most other authors, show that gender does not play a significant role in terms of reading speed and reading comprehension.

Additional analysis revealed that two children, each from the total sample of the sixth, seventh and ninth grade read slower than their age. The largest number of children with reading difficulties was found in the eighth grade, three of them, or 1.5% of the sample. Finally, our

results show that nine children, or 4.5% of them from the entire sample, struggle with reading difficulties. The overall results of our research show that reading difficulties are not specific to only one age group, but that they occur in all the examined classes. Although the number of children with reading difficulties is not high, our results show that in every examined grade (from sixth to ninth) there are pupils with reading difficulties. These findings indicate the need for additional educational interventions, in order to provide adequate and continuous support for pupils with reading difficulties.

Conclusion

Based on the conducted research, it can be concluded that the reading speed and reading comprehension of primary school-aged adolescents gradually increases. However, it was shown that in every examined class there are pupils who read very slowly, as well as pupils with difficulties in comprehending what they read. Gender did not prove to be a significant variable for reading speed and reading comprehension in primary school-aged adolescents. The overall results of the research show that 4.5% of adolescents in the examined sample have reading difficulties. Finally, our results indicate the need to provide adequate and continuous support to children and adolescents with reading difficulties.

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