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Investigation of the Relationship Between Attention Level and Reading Speed in Children

Çocuklarda Dikkat Düzeyi ile Okuma Hızı Arasındaki İlişkinin İncelenmesi

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Abstract:

This study aimed to investigate the connection between attention and reading speed in children. The research design used descriptive analysis and a relational screening model. The sample consisted of 334 students aged 9-12 studying in 3rd and 4th grades in schools in Bakırköy, Istanbul. The research was conducted at 60th Year Primary School, Muhittin Üstündağ Primary School. Study group of the research criterion sampling method, one of the purposive sampling methods, was used. The study obtained data using the Personal Information Form, Reading Speed Measurement, and D2 Attention Test Scale. The data obtained from the study were previously recorded in the SPSS 25.00 program in a controlled manner. The types of analysis used were determined according to the research problems, and Pearson correlation analysis was used for the presence of relationships between variables. The level of the variables in the research was revealed with descriptive statistics, and comparison (t-test and ANOVA) tests were used to examine the differentiation status according to the independent variables. The analysis found a weak positive relationship between reading speed per minute and the total number scores of the d2 attention test among the participating children. Additionally, significant differences were observed between reading speed per minute scores and certain sociodemographic characteristics of the participants. In this sense, conducting similar research with different age groups can contribute to how students' reading speeds vary according to class and age.

Keywords: Reading, Reading speed, Attention, Attention test, d2 attention test

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Öz:

Bu çalışmanın amacı, çocuklarda dikkat ve okuma hızı arasındaki bağlantıyı araştırmaktır. Araştırma deseninde betimsel analiz ve ilişkisel tarama modeli kullanılmıştır. Araştırmanın örneklemini İstanbul Bakırköy'deki okulların 3. ve 4. sınıflarında öğrenim gören 9-12 yaş aralığındaki 334 öğrenci oluşturmaktadır. Araştırmanın yapıldığı okullar 60. Yıl İlkokulu, Muhittin Üstündağ İlkokulu'dur. Araştırmanın çalışma grubunda amaçlı örnekleme yöntemlerinden ölçüt örnekleme yöntemi kullanılmıştır. Araştırmada veriler Kişisel Bilgi Formu, Okuma Hızı Ölçümü ve D2 Dikkat Testi Ölçeği kullanılarak elde edilmiştir. Çalışmadan elde edilen veriler önceden SPSS 25.00 programına kontrollü bir şekilde kaydedilmiştir. Kullanılan analiz türleri araştırma problemlerine göre belirlenmiş, değişkenler arasındaki ilişkilerin varlığı için Pearson korelasyon analizi kullanılmıştır. Araştırmada yer alan değişkenlerin düzeyi betimsel istatistiklerle ortaya konmuş, bağımsız değişkenlere göre farklılaşma durumunu incelemek için karşılaştırma (t-testi ve ANOVA) testleri kullanılmıştır. Analizler sonucunda katılımcı çocukların dakikada okuma hızı ile d2 dikkat testi toplam sayı puanı arasında pozitif yönde zayıf bir ilişki bulunmuştur. Ayrıca, dakika başına okuma hızı puanları ile katılımcıların bazı sosyodemografik özellikleri arasında anlamlı farklılıklar gözlenmiştir. Bu anlamda benzer araştırmaların farklı yaş gruplarıyla yapılması, öğrencilerin okuma hızlarının sınıf ve yaşa göre nasıl değiştiği konusunda katkı sağlayabilir.

Anahtar Kelimeler: Okuma, Okuma hızı, Dikkat, Dikkat testi, d2 dikkat testi.

Introduction

Reading is the exchange of ideas between the reader and the author, which takes place in a convenient environment where the reader tries to understand the text and to reveal new meanings by adding his understanding and prior knowledge (Pearson & Gallagher, 1983; Güneş, 2016). In the reading process, reading is seen as the learning area that makes the greatest contribution to the development of the mind, such as translating writings into mental concepts, making and structuring their understanding in the brain (Karasakaloğlu & Bulut, 2012). Reading allows the individual to expand and deepen their horizons by learning new words, gaining new understandings, having new dreams, and developing creativity. Learning, Sarı (2001) mostly takes place through reading. Students who are not accustomed to reading and cannot understand what they read cannot be expected to succeed in their courses, improve their vocabulary and gain new experiences (Arslan, 2013; Schallert, 2017; Kocisky, et.al., 2018).

Reading attitudes can be defined as the student's feelings toward reading, which positively or negatively affect their attitude toward reading tasks (Stokmans, 1999; Ogurlu, 2014). The reading attitude is just as important as the student's ability to read. This approach plays an important role in the development of a student's lifelong reading skills. It is known that there is a factor that affects reading attitude. If we list these factors, ability, success, self, home environment, interest, gender and intelligence can be counted (Kush, Watkins and Brookhart, 2005; Kırmızı, 2008). For good readers, there is a positive relationship between ability and reading attitudes. According to Wilson and Casey (2007), children who love to read will read more often. This attitude and willingness to read will also contribute significantly to reading development.

McDonalds and Trautman (2006) emphasizes that in order for children to succeed in the modern world, they must learn to read well but also have critical reading skills for long-term success (Honig, 1996; Wehby et al., 2003). Critical reading involves asking the reader questions about the texts they read, developing hypotheses and judgments, and solving problems by taking into account the data in the text (Çifci, 2006). To criticize what the reader reads, one must pay attention to truthfulness, truthfulness, rationality,

credibility, and contradictions in everything that is said (Allor et al., 2010). Özdemir (2002) considers critical reading skills as the highest dimension of literacy. Similarly, Carr (1988) suggests that critical reading is the source of higher-level skills. Kettler (2014) emphasized that gifted children have a more developed critical thinking ability compared to their peers. This process, which is not natural in the life of the individual, but can be acquired later, affects the whole life, provides competence in social, cultural and cognitive fields, is quite complex and dynamic, turns into a process of establishing a new meaning after the reader reinterprets the text read with the information that the reader has already acquired (Duman, 2012). This process of meaning-making is a mechanism that contributes more to one's life. It is seen that the healthy functioning of this mechanism positively affects the educational life and social-cultural life of the individual (Turan & Şişman, 2000). For this reason, reading needs to be questioned more in recent years. The common conclusion drawn from these inquiries is that reading is fluent (NICHD, 2000); in other words, it should be as if it were speaking (Keskin & Akyol, 2014). As a result of the studies on fluent reading, the importance of fluent reading is emphasized and shows that it is based on the cognitive processes of the reader. (Keskin & Akyol, 2014). The relationship of these processes with comprehension makes fluent reading important. There seem to be two approaches to the relationship between fluent reading and comprehension, "automaticity" and "prosodicy". Automaticity theory emphasizes the limitations of individuals' attention resources in the process of reading. Automaticity is important in the reading process because if readers devote most of their limited attention resources to word recognition, there will be fewer attention resources left to understand (Uzunkol, 2013). A problem or deficiency in fluency adversely affects comprehension. Students who do not have both basic reading and writing skills in the first and following years of primary education cannot be expected to have healthy teaching communication if solutions are not found to these problems. Teachers are asked to identify their problems and find appropriate solutions by paying special attention to these students (Aylanç, 2012). In the literature, it is

stated that different fluency reading strategies have been developed in order to eliminate learning difficulties in the field of reading and many studies have been carried out to evaluate the effectiveness of these strategies. Repetitive reading, echo reading, harmonious reading and paired reading are the most important among these strategies (Yüksel, 2010). However, there are studies on reading and mind management (Güneş, 2012), reading education (Aytaş, 2005), fluent reading (Baştuğ & Akyol, 2012), the relationship between the readability levels of texts and the reading skills of students (Durukan, 2014). However, there was no national study on the relationship between attention level and reading speed. It is thought that children's attention levels and reading speeds may be important in their academic development. Therefore, in this study, it is important to examine the relationship between attention level and reading speed in children.

Word recognition should be automatic so that readers can devote more mental resources to comprehension in the reading process because comprehension is expressed as the justification for reading (Tanju, 2010). Therefore, readers should perform word recognition with minimal attention and mental capacity. (Baştuğ & Akyol, 2012). The importance of the study is that there is no national study examining the relationship between attention level and reading speed in the literature. It is thought that children's attention levels and reading speed may be important in their academic development. Therefore, examining the relationship between attention level and reading speed in children is important. The problem of this research is to analyze attention in children. This study aims to examine the relationship between attention and reading speed in children.

Hypotheses of the Study

H0: There is no direct relationship between attention scale and reading speed scores in children.

H1: There is a direct relationship between the attention scale and reading speed scores of children.

H0 There is no difference between genders in children's attention scale scores.

H2 There is a difference between genders in children's attention scale scores.

H0: There is no difference between age variables in children's attention scale scores.

H3: There is a difference between age variables in children's attention scale scores.

H0: There is no difference in children's attention scale scores between class variables.

H4: There is a difference in children's attention scale scores between class variables.

Methods

Research design

The research model is the relational survey model. The aim of this model is to collect general information about a specific population (Lambert & Lambert, 2012). The correlational survey model is a research model that aims to explain whether two or more variables change together and the direction and magnitude of the degree of change. The study was conducted on the whole population (or a selected sample) to understand the relationships between different variables and the degree and magnitude of change (Lans & Van der Voordt, 2002). Although the relationships found through this model do not establish true cause and effect relationships, they provide valuable clues (Dulock, 1993). By knowing the position of one variable relative to another, predictions can be made about the position of that variable (Karasar, 2010; Siedlecki, 2020).

Participants

The population of the research consists of students attending 9 and 12 grades in a public school in Bakırköy district of Istanbul. The research population consists of 334 students aged 9-12 in the 3rd and 4th grades in the Bakırköy district of Istanbul in the 2020-2021 academic year. The schools where the research was conducted were 60th Year Primary School, Muhittin Üstündağ Primary School. This study was conducted using purposive sampling method. Purposive sampling is a non-probability sampling technique that involves the researcher selecting participants for the study using their own judgment. This method aims to create a smaller subset of the population and the researcher selects individuals by considering the population's history and current variations. Purposive sampling is particularly useful for researchers who want to target people with a particular profile or characteristics. This method is most effective with smaller sample sizes and more homogenous populations. Purposeful criterion sampling, one of the purposeful sampling methods, was used. It is the determination of the sample according to predetermined criteria. In this study, demographic information of 334 participants was analyzed. Most participants were male (53.6%) and the rest were female (46.4%). The majority of the participants were 9 years old (57.5%) and the rest were 10 years old (42%). When we look at the grades, 47.9% of the students are in the 4th grade and 52.1% are in the 3rd grade. Researchers can create an accurate and cost-effective sample by using a purposive sampling method.

The voluntary consent form was obtained from the parents of the students participating in the study. The approval of the research in the schools where the research was conducted was obtained with the permission of the Ministry of National Education with the number E-59090411-44-48213581. The ethical approval of the research was obtained with the decision of Istanbul Gelisim University dated 10.06.2021 and 2021-32. The text explains the data collection tools used in a research study conducted during the pandemic. Due to social distancing measures, face-to-face data collection was carried out while ensuring safety. Informed consent forms were obtained from the participants, who were then asked to fill out scales. Necessary permissions were obtained from relevant institutions before the research began. The data collection included the use of three tools: the Personal Information Form, the Reading Speed Measurement, and the D2 Attention Test Scale. The first measurements were made from the sample group formed after the determination of the subject of the research and the application of the research was carried out after the necessary permissions were obtained. Within the scope of the research, the Measurement of Reading Speed and D2 Attention Test Scale were used. In the first stage, data on reading speed were collected and analyzed. In the second stage, the attention test was applied and analyzed.

Personal Information Form

The Personal Information Form gathered demographic information such as gender, education level, and age.

Measurement of Read Speed

The Reading Speed Measurement involved calculating reading speed based on the formula of word count divided by reading time per minute. Expert opinion was sought to clarify the reading text. Overall, the study aimed to gather information from students in schools affiliated with the Ministry of National Education following the lifting of pandemic restrictions (Granello & Wheaton, 2004).

In the first stage, data on reading speed were collected and analyzed. For this, the number of words of the text read x 60 / reading time = 1 minute will be made with the formula of the number of words read (Walpole & McKenna, 2007). The reading text will be clarified by taking expert opinion during the process.

Reading speed is measured when (the student) is doing "silent reading".   The following formula will be used (Öznur Karaeloğlu,2014).

Reading Speed = Total number of words in text x60

    (Read time read per minute (seconds)

     Word count)

Children with fluent reading skills were included in the study. The texts used in the research to measure the reading speed were prepared by Karaca (2022) according to the "Ateşman Readability Scale".

d2 Attention test

One of these tools is the d2 Attention Test, which was developed in 1962 in Essen, Germany. This test attempts to look at characteristics such as attention, concentration and perceptual speed. It was Brickenkamp and Zimmer (1998) who standardized the test and made it suitable for today's use.

The d2 Attention Test is a test that measures selective attention in a time-dependent manner. The speed at which the task is performed, compliance with the rules and the quality of performance are the sub-characteristics measured (Brickenkamp & Zillmer, 1998). The visual scan applied in the d2 Attention Test is an important component of selective attention (Strauss, Sherman & Spreen, 2006).

The test can be administered individually or in groups to individuals between the ages of 9 and 60. The one-page test form contains a total of 658 figures, including 14 rows and 47 in each row. The letters 'd' and 'p' are used in the test. Some letters have a total of one, two, three, and four dots below or above them. In the test, letters can be found in a total of 16 different ways, depending on where they get their numbers and numbers.

The main task of the exam-taker is to find the letter 'D', which has a total of two points. These can be found in the test in three different ways. The test taker is given 20 seconds to perform the task specified in each row. The

duration of the test is approximately eight minutes. In a group practice, 7-8 minutes more minutes are required outside the task due to giving instructions during the preparation phase, checking whether the guidelines are understood and sample practice (Yaycı, 2013).

Two separate scoring keys are used to calculate test scores. Six points are obtained during the test. These; TN (total number of marked figures), E1 (number of figures skipped without marking), E2 (number of figures marked incorrectly), CP (number of total correctly marked figures), TN-E (test performance) and E% (proportion of errors) (Yaycı, 2013).

The adaptation of d2 Attention Test to Turkey and the norm study were conducted by Toker (1993). Although the reliability of this test is found to be high for Istanbul children aged 11-14, it is recommended to conduct additional studies on its validity. Although there was no statistically significant difference, it was seen that the test performance of girls was better than boys. The reliability of the two halves was found to be .94. In the validity study, a .44 correlation was found between the WISC-R password subtest and the total score. Low correlations were obtained between teachers' active or passive children's psycho-motor speeds and will-resilience (not giving up easily) and error-making rates (r=.10 and r=.16) (Yaycı, 2013).

Statistical analysis

The study was conducted with 155 female and 179 male participants. IBM SPSS 25 program was used for data analysis. Frequency and percentage values for categorical variables and continuous. Mean and standard deviation values are reported for the variables. No outlier was found and normality and linearity values were found satisfactory. The kurtosis and skewness values were taken as basis to examine the suitability of the scale scores for normal distribution. These values between +2 and -2 are considered to be sufficient for normal distribution (George & Mallery 2010).

Missing data was examined, and Pearson correlation analysis was used to analyze the relationships between variables (Benesty, ChenHuang & Cohen, 2009). Descriptive statistics and comparative tests (t-test and ANOVA) were used to examine the differentiation of variables based on the level of independent variables (Kim, 2015; McHugh, 2011).

The first measurements were made from the sample group formed after the determination of the subject of the research and the application of the research was carried out after the necessary permissions were obtained. Within the scope of the research, the Measurement of Reading Speed and D2 Attention Test Scale were used. In the first stage, data on reading speed were collected and analyzed. In the second stage, the attention test was applied and analyzed. In the interpretation of the significance of the findings, 95% confidence interval and 0.05 significance level were taken as criteria.

Results

The findings from the personal information form given to the students, in line with the sub-problems of the study, were then presented.

Table 1. D2 Attention Test t-Test Analysis Results According to Gender Variable of Participants

Variables	Groups	n	Mean	SS	S.E	df	t	p
TN	Male	179	309,6760	77,27091	5,77550	229	332	,819
	Female	155	307,6710	82,65930	6,63935	,		
E1	Male	179	171,3631	168,29925	12,57928	229	332	,835
	Female	155	167,5161	167,31056	13,43871			
And	Male	179	8,7821	12,94641	,96766	229	325,739	,835
	Female	155	9,5226	18,40854	1,47861			
TNE	Male	179	9,0285	8,39051	,62714	229	271,133	,676
	Female	154	11,4067	9,56122	,77047			
FRI	Male	179	18,0279	70,94334	5,30255	229	-1,534	,126
	Female	155	19,4581	66,63720	5,35243			
TN%	Male	179	18,0279	8,28728	,61942	229	329,790	,132
	Female	155	19,4581	8,73360	,70150			
TNE%	Male	179	69,7358	29,86266	2,23204	229	5,206	**,000**
	Female	155	51,5465	34,09072	2,73823			
Read Speed per Minute	Male	179	144,3296	30,42737	2,27425	229	1,705	,089
	Female	155	134,3613	33,41000	2,68356			

t-Test was conducted to examine the performance of male and female students on the d2 attention test. The results showed no significant difference in performance between the two genders. Scores on various test dimensions, including total number, forgotten letters, errors, d2 attention test, and attention release, did not differ significantly based on gender. This suggests that gender does not significantly affect an individual's performance on the attention test. The p-values for all comparisons were greater than the significance level of 0.05, indicating that the observed differences were likely due to chance rather than a true difference between males and females. Overall, the study found that boys and girls perform similarly in terms of attention and focus according to the d2 attention test (t (229) = 5,206, p>.05). However, it is worth noting that the total scores of male participants were higher (mean 69.7358 ± 29.86266) than those of female participants (mean 51.5465 ± 34.09072). The t-test results also showed no significant difference in reading speed between boys and girls (p>.05).

Table 2. D2 Attention Test t-Test Analysis Results According to the Class Variable of the Participants

Variables	Groups	n	Mean	SS	S.E	t	df	p
TN	4.class	160	333,1500	81,35559	6,43172	5,606	332	**,000**
	3.class	174	286,3046	71,32328	5,40700			
E1	4.class	160	333,1500	81,35559	6,43172	48,995	332	**,000**
	3.class	174	19,1667	22,04858	1,67150			
And	4.class	160	8,4188	11,11375	,87862	-,789	332	,431
	3.class	174	9,7759	18,97279	1,43832	-,805		
TNE	4.class	160	10,4067	8,97200	,70930	,541	331	,589
	3.class	173	9,8709	9,07445	,68992	,541		
FRI	4.class	160	295,6125	67,55440	5,34064	,338	332	,735
	3.class	174	257,5345	65,57744	4,97141			
TN%	4.class	160	18,8563	8,64961	,68381	,338	332	,735
	3.class	174	18,5402	8,41043	,63759	,338		
TNE%	4.class	160	72,1775	29,60160	2,34021	5,249	332	**,000**
	3.class	174	54,1397	32,91389	2,49520	5,273		
Read Speed per Minute	4.class	160	70,0831	30,50219	2,41141	4,810	332	**,000**
	3.class	174	53,2132	33,35971	2,52899	4,828		

According to the t-tests conducted, there was a statistically significant difference between the total number (TN) scores of 4th and 3rd grade participants in the d2 attention test, indicating that the 4th graders had higher scores ((332) =5,606, p<.05). The mean total number score for 4th-grade participants was 333.1500 (± 81.35559), while for 3rd-grade participants it was 286.3046 (± 71.32328). However, when looking at the E scores, there was no statistically significant difference between the 4th and 3rd graders in the d2 attention test (t (332) = 48,995, p<.05). This suggests that the participants' attention test scores did not differ significantly based on their grade level. In summary, the findings from Table 2 indicate that 4th-grade participants (mean 333.1500 ± 81.35559) generally performed better than 3rd-grade participants (mean 19.1667 ± 22.04858) in the total number scores of the d2 attention test, but there was no significant difference in the E scores between the two groups.

The t-Test analysis of Table 2 shows that there was no statistically significant difference in the release of attention scores between 4th and 3rd graders in the d2 attention test based on the grade variable (p>.05). However, there was a statistically significant difference in the d2 attention test scores between the two groups (**t**(332)= 5.249; p>.05). The mean reading speed per minute scores were higher in the 4th-grade participants (mean 72.1775 ± 29.60160) compared to the 3rd-grade participants (mean 54.1397 ± 32.91389). Additionally, there was a statistically significant difference in the reading speed per minute scores between the 4th (mean 70.0831 ± 30.50219) and 3rd graders (mean 53.2132 ± 33.35971). based on the gender variable, with the mean scores being higher in the 4th-grade participants. Overall, the t-test analysis revealed significant differences in the d2 attention test and reading speed per minute scores based on grade and gender variables (t (332) = 4,810; p>.05).

Table 3. D2 Attention Test t-Test Analysis Results According to Age Variable of Participants

Variables	Groups	n	Mean	SS	S.E	t	df	p
TN	**9**	192	297,0260	76,99102	5,55635	-3,167	332	**,002**
	10	142	324,5915	80,82677	6,78283			
E1	**9**	192	88,5260	139,26087	10,05029	-12,418	332	**,000**
	10	142	279,1690	137,94227	11,57586			
And	**9**	192	9,5885	18,53827	1,33788	,626	332	,532
	10	142	8,5000	10,76160	,90309			
TNE	**9**	191	265,7917	9,46298	,68472	-3,110	331	**,002**
	10	142	289,2746	8,40975	,70573			
FRI	**9**	192	18,6927	67,64458	4,88183	,003	332	,998
	10	142	18,6901	69,00757	5,79099			
TN%	**9**	192	18,6927	8,82075	,63658	,003	332	,998
	10	142	18,6901	8,11284	,68081			
TNE%	**9**	192	58,4635	32,59999	2,35270	-2,844	332	**,005**
	10	142	68,6176	31,78567	2,66739	-2,855		
Read Speed per Minute	**9**	192	57,5891	32,81586	2,36828	-2,398	332	**,017**
	10	142	66,3049	32,86488	2,75796	-2,398		

In Table 3, there were significant differences in the scores of the d2 attention test between 9-year-old and 10-year-old participants (t(332)= -3,167, p<.05). The total number scores were higher for the 10-year-olds (mean 324.5915 ± 80.82677) compared to the 9-year-olds (mean 297.0260 ± 76.99102). Additionally, there were significant differences in the scores for forgotten letters (d) in the test (t (332) = -12.418, p<.05), with the 10-year-olds scores (mean 279.1690 ± 137.94227) having higher scores than the 9-year-olds (mean 88.5260 ± 139.26087). However, when it came to the number of errors in the test, there was no significant difference between the scores of 9-year-olds and 10-year-olds. Overall, this suggests that age has an impact on attention test scores, particularly in terms of the total number of correct answers and forgotten letters, but not in terms of the number of errors made (p>.05).

The results of the t-test analysis in Table 3 show several significant differences between the scores of 9-year-old and 10-year-old participants on the d2 attention test (t(332)= -3,110, p<.05). Firstly, the scores on the TNE (total number) variable show a significant difference between 10-year-old participants (mean: 265.7917 ± 9.46298) and the scores of 9-year-old participants (mean: 289.2746 ± 8.40975). On the other hand, there is no significant difference in the scores for release of attention (FR) between the two age groups(p>.05). Additionally, there is a significant difference in the scores on the TNE% (total number percentage) variable (t (332) = -2.844; p<.05), with 10-year-olds (mean 68.6176 ± 31.78567) scoring higher than 9-year-olds (mean 58.4635 ± 32.59999). Finally, the reading speed per minute scores also show a significant difference between the two age groups (t (332) = -2.398; p<.05). This finding was found to be higher than the total number scores of 10-year-old participants (mean 66.3049 ± 32.86488) than the scores of reading speed per minute scores (mean 57.5891 ±

32.86488) in the test of 9-year-old participants. Overall, these results suggest that age has an impact on the performance of participants on the d2 attention test, particularly in the variables of total number scores and reading speed.

Table 4. Pearson Correlation Analysis Result Table for the Relationship Between Participants' Read Rate Per Minute and D2 Attention Test Scores

Variables		TN	E1	And	TNE	FRI	TN%	TNE%
Read Speed per	**r**	,199**	,270**	-,050	,229**	-,074	,178**	,211**
Minute	**p**	,000	,000	,363	,000	,177	,001	,000
	n	334	334	334	334	334	334	334

According to the Pearson Correlation analysis found that there is a weak positive correlation between reading speed per minute and the total number (TN) score on the d2 attention test (r=.199; p<.05). This means that higher reading speed is associated with higher scores on the attention test. There is also a weak positive correlation between the reading rate per minute and the forgotten d letters (E1) score on the d2 attention test, indicating that as reading rate per minute increases, the forgotten d letters score also increases (r=.270; p<.05). However, there is no significant correlation between reading rate per minute and the number of errors (E) score on the d2 attention test (p>.05). On the other hand, there is a weak positive correlation between reading rate per minute and the total number of errors (TNE) score on the d2 attention test (r=.229; p<.05), suggesting that as reading rate per minute increases, the total number of errors score also increases. The study also found a weak positive correlation between reading rate per minute (r=.178; p<.05) and the total number score on the test and the individual's score on the d2 attention test (r=.211; p<.05), indicating that higher reading rate per minute is associated with higher scores on the test. Overall, the study reveals that reading speed is related to performance on the d2 attention test, but other factors also play a role.

Discussion

In this study, the relationship between attention and reading speed in children was investigated, along with the influence of personal characteristics on these variables. The researchers collected data through scale sets and analyzed them to determine the findings of the study. The results were then discussed in relation to existing literature. Reading comprehension was identified as a complex task that involves various cognitive processes and skills. Studies on reading skills have a substantial history, with significant knowledge gained since 1975.

According to the first alternative hypothesis of the study, there is a direct relationship between the attention scale and reading speed scores in children, there was a weak positive relationship between the Reading Speed per Minute and the total number (TN) score of the d2 attention test, and as the Reading Speed per Minute scores increased, the total number (TN) scores of the d2 attention test increased, There was a weak positive correlation between Reading Speed Per Minute and the forgotten d letters (E1) score in the d2 attention test, and as the Reading Speed Per Minute scores increased, the forgotten d letters (E1) scores in the d2 attention test increased, There was a weak positive correlation between Reading Speed per Minute (RPM) and the individual's score on the d2 attention test (TNE) and as the RPM scores increased,

the individual's score on the d2 attention test (TNE) scores increased, there was a weak positive correlation between Reading Speed per Minute (RPM) and the total number score on the d2 attention test (TNPI) and as the RPM scores increased, the total number score on the d2 attention test (TNPI) scores increased, It was found that there was a weak positive correlation between Reading Speed per Minute and the score (TNEYpercentage) of the individual in the d2 attention test and as the Reading Speed per Minute scores increased, the score (TNEYpercentage) of the individual in the d2 attention test increased. Therefore, H0 is rejected and hypothesis H1 is accepted. Based on the results of a study conducted on children, a weak positive relationship was found between reading speed and attention scores. The study revealed that as reading speed increased, the total number scores and forgotten letter scores in the d2 attention test also increased. Additionally, there was a weak positive correlation between reading speed and the TNE score, indicating that as reading speed improved, TNE scores also increased. Similarly, there was a weak positive correlation between reading speed and the TNPercent score, suggesting that as reading speed rose, TNPercent scores in the d2 attention test also increased. Understanding the nature of reading comprehension and its effectiveness is crucial in further exploring reading skills. Unlike decoding, reading aloud, and preparation for reading, those who receive reading skills training are characteristic of working in other aspects of reading. "Each individual has a table that lists the different pages in the book. When a page in the list is finished reading, stop and make a prediction. Type the forecast in the column that says 'Forecast'. When you get to the next page in the list, check to see if your prediction is 'Happened', 'It won't happen' or 'It can still happen'. Then make another guess and write." (Duke & Pearson, 2009). This study focuses on the process of attention and its relationship to reading speed. Attention is the process of selecting specific sensory inputs from the many available options. It enables information to be transferred from sensory memory to short-term memory for further processing and recognition. In the context of learning letters, children rely on attention to distinguish between different features of letters, such as the presence of a line adjacent to a circle or its position relative to a vertical line. This highlights the importance of attention in the fundamental reading process (Yıldız & Çetinkaya, 2017).

The second alternative hypothesis of this study is that there is a difference between genders in children's attention scale scores representing that there was a statistically significant difference between the total scores of the participants in the d2 attention test between girls and boys according to the gender variable, and that the total scores of the male

participants were higher than the total number scores of the female participants. Therefore, H2 is rejected and hypothesis H1 is accepted. The neurocognitive functioning of individuals with attention problems was investigated in a study. The study compared four groups between the ages of 13 and 17: 30 male controls, 35 female controls, 24 males with ADHD and 25 females with ADHD. Participants completed tests of reading speed, processing speed, memory, inhibition, setting switching and interference. The results showed that men with ADHD and women with ADHD performed similarly, with only one notable difference: Men with ADHD showed some evidence of greater inhibition impairment than women with ADHD. In contrast, after controlling for reading ability, comorbidity and IQ, both men and women with ADHD showed some impairment in working memory, naming speeds, processing abilities and inhibition deficits compared to controls. This study supports the growing body of literature documenting impaired neurocognitive functioning in both men and women with ADHD (Rucklidge, 2006).

The alternative third hypothesis of the study is that there is a difference between the scores of children's attention scale and age representing that there was a statistically significant difference between the d2 attention test and reading comprehension scores of the participants aged 9 and 10 years according to the age variable of the participants, and the total number scores of the participants aged 10 years were higher than the total number scores of the participants aged 9 years. Therefore, H0 is rejected and hypothesis H3 is accepted. One study examined the effects of repeated practice on the divided attention performance of young and older adults. Six young and 6 older adults performed two perceptual-motor tasks under both single and dual-task conditions over six 1-hour sessions. Absolute performance levels reliably improved across sessions for both younger and older participants, but divided attention performance remained poorer in older than in younger adults. Relative divided attention costs were consistently higher for older adults across experimental sessions (Somberg & Salthouse, 1982). These results confirm previous suggestions that older people are particularly vulnerable to the effects of divided attention. The findings provide important conclusions regarding age differences in divided attention performance (McDowd, 1986).

The alternative fourth hypothesis of the research is that there is a difference in children's attention scale scores between class variables. represent that a statistically significant difference was found in the total number (TN) scores of the d2 attention test between the 4th grade and the 3rd grade according to the class variable of the participants. In this context, it was determined that the total number scores of the 4th-grade participants were higher than the total number scores of the 3rd-grade participants. Therefore, H0 is rejected and hypothesis H4 is accepted. The results of a study in which the relationship between reading fluency, reading comprehension and attention levels of fourth-grade students was examined and which was conducted using the relational survey model and included 132 fourth-grade students with adequate reading skills at grade level showed that good reader attention has significant effects on reading speed, prosody, word recognition and comprehension, respectively. A higher level of relationship was also found between

attention, reading speed and prosody (Yildiz & Çetinkaya, 2017, p.370).

Conclusion

As a general result, according to the results obtained as a result of a direct examination between the attention scale and reading speed scores in the children participating in the study, there was a weak positive relationship between the Reading Speed per minute and the total number (TN) score of the d2 attention test, and as the Reading Speed per minute scores increased, the total number (TN) scores of the d2 attention test increased, There was a weak positive correlation between Reading Speed per Minute and the forgotten d letters (E1) score in the d2 attention test, and as the reading speed per minute scores increased, the forgotten d letters (E1) scores in the d2 attention test increased, It was determined that there was a weak positive correlation between Reading Speed per Minute and the score (TNE) score of the individual in the d2 attention test, and as the reading speed per minute scores increased, the score (TNE) scores of the individual in the d2 attention test increased, and there was a weak positive correlation between Reading Speed per Minute and the total number score (TNPercent) score of the individual in the d2 attention test, and as the reading speed per minute scores increased, the total number score (TNPercent) scores increased in the d2 attention test. According to the gender variable of the participants, it was determined that there was a statistically significant difference between the total scores of the participants in the d2 attention test between girls and boys, and the total scores of the male participants were higher than the total number scores of the female participants.

Recommendations

Recommendations in line with the results obtained from this study; This research was conducted with 350 participants. It is recommended to be repeated with more participants and different age groups at different times and places. This research was conducted as a relational survey. It is recommended to be supported by observational and experimental studies with different study methodologies in future studies. The independent variable of our research was determined as speed reading and the dependent variable as attention. In addition to these variables, it is recommended to examine different variables that will affect or change the dependent variable. Apart from this, the results to be obtained in a study to be carried out by giving Structured Comprehension Reading Training prepared based on "attention" to an experimental group may give an idea to educators about the material to be presented to students in this subject in education. It is recommended that families or individuals attach importance to reading and reading comprehension, and in this context, it is recommended that they receive support from organizations that provide Fluent Reading, Strengthening Comprehension Skills and Structured Comprehension and Speed-Reading Training prepared based on "attention". In addition, it is recommended that they receive different attention-oriented programs and, if necessary, psychotherapies.

Declarations

Ethics Approval and Consent to Participate

The approval of the research in the schools where the research was conducted was obtained with the permission

of the Ministry of National Education with the number E-59090411-44-48213581. The ethical approval of the research was obtained with the decision of Istanbul Gelisim University dated 10.06.2021 and 2021-32. Informed consent forms were obtained from the participants, who were then asked to fill out scales.

Consent for Publication
Not applicable

Availability of Data and Materials
Not applicable.

References

Allor, J. H., Mathes, P. G., Roberts, J. K., Jones, F. G., & Champlin, T. M. (2010). Teaching students with moderate intellectual disabilities to read: An experimental examination of a comprehensive reading intervention. *Education and Training in Autism and Developmental Disabilities*, 45(1), 3-22.

Arslan, A. (2013). Okuma becerisi ile ilgili makalelerde cinsiyet değişkeni. *Uluslararası Türkçe Edebiyat Kültür Eğitim (TEKE) Dergisi*, 2(2), 251-265.

Aylanç, M. (2012). Türkçe öğretmeni adaylarının özel öğretim yöntemleri dersi uygulamalarında karşılaştıkları sorunlar: Bilgilendirici ve öğretici metinler örneği. *Selçuk Üniversitesi Türkiyat Araştırmaları Dergisi*, 31, 333-350.

Aytaş, G. (2005). Okuma eğitimi. *Türk Eğitim Bilimleri Dergisi*, 3(4), 461-470.

Baltacı, A. (2018). Nitel araştırmalarda örnekleme yöntemleri ve örnek hacmi sorunsalı üzerine kavramsal bir inceleme. *Bitlis Eren Üniversitesi Sosyal Bilimler Dergisi*, 7(1), 231-274.

Baştug, M., & Akyol, H. (2012). Akıcı Okuma becerilerinin okuduğunu anlamayı yordama düzeyi. *Kuramsal Eğitimbilim Dergisi*, 5(4), 394-411.

Bell, T. (2001). Extensive reading: Speed and comprehension. *Reading matrix*, 1(1).

Benesty, J., Chen, J., Huang, Y., & Cohen, I. (2009). Pearson correlation coefficient. In *Noise reduction in speech processing* (pp. 1-4). Berlin: Springer.

Brickenkamp, R., & Zillmer, E. (1998). *The d2 test of attention*. Washington: Hogrefe & Huber Publishers.

Brown, P. & Hirst, S.B. (1983). Writing reading courses: The interrelationship of theory and practice. In C. J. Brumfit (Eds.), *Language teaching projects for the third world*. London: British Council.

Carr, K. S. (1988). How can we teach critical thinking? *Childhood Education*, 65(2), 69-73.

Champeau de Lopez, C. L. (1993). Developing reading speed. *English Teaching Forum*, 31(1), 50-51.

Coady, J. (1979). A psycholinguistic model of the ESL reader. In R. Mackay, B. Barkman, & R. R. Jordon (Eds.), *Reading in a second language* (pp 5-12). Rowley, MA: Newbury House.

Cooper, J. R. (1984). *Reading Adrienne Rich: Reviews and re-visions, 1951-81*. Michigan: University of Michigan Press.

Çifci, M. (2006). Eleştirel okuma. *Türk Dili Araştırmaları Yıllığı-Belleten*, 54(1), 55-80.

Duke, N. K., & Pearson, P. D. (2009). Effective practices for developing reading comprehension. *Journal of Education*, 189(1-2), 107-122.

Dulock, H. L. (1993). Research design: Descriptive research. *Journal of Pediatric Oncology Nursing*, 10(4), 154-157.

Duman, M. Z. (2012). Aile kurumu üzerine tarihsel bir okuma girişimi ve muhafazakâr ideolojinin aileye bakışı. *İnsan ve Toplum Bilimleri Araştırmaları Dergisi*, 1(4), 19-51.

Durukan, E. (2014). Metinlerin okunabilirlik düzeyleri ile öğrencilerin okuma becerileri arsındaki ilişki. *Ana Dili Eğitimi Dergisi*, 2(3), 68-76.

George, D., Mallery, M. (2010), *SPSS for Windows Step by Step: A Simple Guide and Reference, 17.0 Update*, 10th Edition, Pearson, Boston

Granello, D. H., & Wheaton, J. E. (2004). Online data collection: Strategies for research. *Journal of Counseling & Development*, 82(4), 387-393.

Güneş, F. (2012). Okuma ve zihni yönetme. *Mustafa Kemal Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 9(18), 1-15.

Güneş, F. (2016). Kağıttan ekrana okuma alanındaki gelişmeler. *Bartın University Journal of Faculty of Education*, 5(1), 1-18.

Hill, J. (1986). *Using literature in language teaching*. London: Macmillan.

Hino, N. (1988). Yakudoku: Japan's Dominant Tradition in Foreign Language Learning. *JALT Journal,* 10 (1/2), 45-55.

Honig, B. (1996). *Teaching our children to read: The role of skills in a comprehensive reading program*. Thousand Oaks, CA: Corwin Press.

Hyland, K. (1990). Purpose and strategy: Teaching extensive reading skills. *English Teaching Forum*, 28(2), 14-18.

Karaca, O. (2022). *Disleksi bilişsel müdahale uygulamaları*. İzmir: Yakın.

Karaeloğlu, Ö. (2014). *Çocuklar için anlayarak hızlı okuma*. İstanbul: Fom Kitap.

Kumrulu, S. & Bal, F. (2024).

Karasakaloğlu, N., & Bulut, B. (2012). Kurmaca metinlerin eleştirel okuma becerisini geliştirme aracı olarak kullanılması. *Dokuz Eylül Üniversitesi Buca Eğitim Fakültesi Dergisi*, 33, 95-106.

Karasar, N. (2010). *Bilimsel araştırma yöntemi*. Ankara: Nobel Akademik Yayıncılık.

Keskin, H., & Akyol, H. (2014). Yapılandırılmış okuma yönteminin okuma hızı, doğru okuma ve sesli okuma prozodisi üzerindeki etkisi. *Ana Dili Eğitimi Dergisi*, 2(4), 107-119.

Kettler, T. (2014). Critical thinking skills among elementary school students: Comparing identified gifted and general education student performance. Gifted Child Quarterly, 58(127), 128-136.

Kırmızı, F. S. (2008). Türkçe öğretiminde yaratıcı drama yönteminin tutum ve okuduğunu anlama stratejileri üzerindeki etkisi. *Pamukkale Üniversitesi Eğitim Fakültesi Dergisi*, 23(23), 95-109.

Kim, T. K. (2015). T test as a parametric statistic. *Korean Journal of anesthesiology*, 68(6), 540-546.

Kocisky, T., Schwarz, J., Blunsom, P., Dyer, C., Hermann, K. M., Melis, G., & Grefenstette, E. (2018). The narrative QA reading comprehension challenge. *Transactions of the Association for Computational Linguistics*, 6, 317-328.

Kush, J. C., Watkins, M. W., & Brookhart, S. M. (2005). The temporal-interactive influence of reading achievement and reading attitude. *Educational Research and Evaluation*, 11(1), 29-44.

Lambert, V. A., & Lambert, C. E. (2012). Qualitative descriptive research: An acceptable design. *Pacific Rim International Journal of Nursing Research*, 16(4), 255-256.

Lans, W., & Van der Voordt, D. J. M. (2002). Descriptive research. In T. M. de Jong, & D. J. M. van der Voordt (Eds.), *Ways to study and research urban, architectural and technical design* (pp. 53-60). Delft: DUP Science.

Light, T. (1970). The reading comprehension passage and a comprehensive reading program. In *English language teaching* (pp 120-124). Oxford: Oxford University Press.

McDonalds, N. B. & Trautman, T.S. (2006). Enhancing critical reading skills with kindergartners: A study of a computer-based intervention. http://www.amered.com/docs/ReviewofEnhancingReadingSkills.pdf.

McDowd, J. M. (1986). The effects of age and extended practice on divided attention performance. *Journal of Gerontology*, 41(6), 764-769.

McHugh, M. L. (2011). Multiple comparison analysis testing in ANOVA. *Biochemia Medica*, 21(3), 203-209.

National Institute of Child Health and Human Development (NICHD) (2000). Report of the national reading panel. *Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction* (NIH Publication No. 00-4769). Washington, DC: U.S. Government Printing Office.

Nuttall, C. (1982). *Teaching reading skills in a foreign language*. London: Heinemann Educational.

Ogurlu, Ü. (2014). Üstün zekâlı ve yetenekli öğrencilerin okuma ilgisi, tutumu ve eleştirel okuma becerileri. *Ankara Üniversitesi Eğitim Bilimleri Fakültesi Özel Eğitim Dergisi*, 15(02), 29-43.

Özdemir, E. (2002). *Eleştirel okuma*. Ankara: Bilgi Yayınevi.

Patton, M. Q. (2005). *Qualitative research*. In B. S. Everitt & D. C. Howell (Eds.), *Encyclopedia of statistics in behavioral science* (pp. 1-3). New York: John Wiley & Sons.

Pearson, P. D., & Gallagher, M. C. (1983). The instruction of reading comprehension. *Contemporary educational psychology*, 8(3), 317-344.

Rabiner, D. L., Coie, J. D., Miller-Johnson, S., Boykin, A. S. M., & Lochman, J. E. (2005). Predicting the persistence of aggressive offending of African American males from adolescence into young adulthood: The importance of peer relations, aggressive behavior, and ADHD symptoms. *Journal of Emotional and Behavioral Disorders*, 13(3), 131-140.

Reynolds, M., & Besner, D. (2005). Basic processes in reading: A critical review of pseudo homophone effects in reading aloud and a new computational account. *Psychonomic Bulletin & Review*, 12(4), 622-646.

Rucklidge, J. J. (2006). Gender differences in neuropsychological functioning of New Zealand adolescents with and without attention deficit hyperactivity disorder. *International Journal of Disability Development and Education*, 53(1), 47-66.

Sarı, M. (2001). İki dilli çocukların çözümleme yöntemiyle okuma yazma öğrenirken karşılaştıkları güçlükler. *Çukurova Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 9(9), 108-122.

Schallert, D. L. (2017). The role of illustrations in reading comprehension. *Theoretical issues in reading comprehension*, 503-524.

Siedlecki, S. L. (2020). Understanding descriptive research designs and methods. *Clinical Nurse Specialist*, 34(1), 8-12.

Somberg, B. L., & Salthouse, T. A. (1982). Divided attention abilities in young and old adults. *Journal of Experimental Psychology*, 8(5):651.

Stokmans, M. J. (1999). Reading attitude and its effect on leisure time reading. *Poetics*, 26(4), 245-261.

Strauss, E., Sherman, E. M., & Spreen, O. (2006). *A compendium of neuropsychological tests: Administration, norms, and commentary*. New York: American Chemical Society.

Susser, B., & Robb, T.N. (1990). EFL extensive reading instruction: research and procedure. *JALT Journal*, 12(2), 161-185.

Tanju, E. H. (2010). Çocuklarda kitap okuma alışkanlığına genel bir bakış. *Sosyal Politika Çalışmaları Dergisi*, 21(21), 30-39.

Toker, M. Z. (1993). Visual Algı Testi D2'nin Geçerlik ve Güvenirlik Çalışması. (Yayınlanmamış Yüksek Lisans Tezi). Boğaziçi Üniversitesi, İstanbul.

Kumrulu, S. & Bal, F. (2024).

Turan, S., & Şişman, M. (2000). Okul yöneticileri için standartlar: Eğitim yöneticilerinin bilgi temelleri üzerine düşünceler. *Balıkesir Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, *3*(4), 68-87.

Uzunkol, E. (2013). Akıcı okuma sürecinde karşılaşılan sorunların tespiti ve giderilmesine yönelik bir durum çalışması. *Mersin Üniversitesi Eğitim Fakültesi Dergisi*, *9*(1), 70-83.

Walpole, S., & McKenna, M. C. (2007). *Differentiated reading instruction: Strategies for the primary grades*. New York: Guilford Press.

Wehby, J. H., Falk, K. B., Barton-Arwood, S., Lane, K. L., & Cooley, C. (2003). The impact of comprehensive reading instruction on the academic and social behavior of students with emotional and behavioral disorders. *Journal of Emotional and Behavioral Disorders*, *11*(4), 225-238.

Weiler, M., Bernstein, J., Bellinger, D., & Waber, D. (2002). Information processing deficits in children with attention-deficit/hyperactivity disorder, inattentive type, and children with reading disability. *Journal of Learning Disabilities*, 35, 448–461.

Williams, E. (1984). *Reading in the language classroom*. London: Macmillan.

Wilson, J. D., & Casey, L. H. (2007). Understanding the recreational reading patterns of secondary students. *Reading Improvement*, 44(1), 40-50.

Yaycı, L. (2013). D2 dikkat testinin geçerlik ve güvenirlik çalışması. *Kalem Uluslararası Eğitim ve İnsan Bilimleri Dergisi*, 3, 43-80.

Yıldız, M., & Çetinkaya, E. Ö. (2017). The relationship between good reader's attention reading fluency and reading comprehension. *Universal Journal of Educational Research*, *5*(3), 366-371.

Yüksel, A. (2010). Okuma güçlüğü çeken bir öğrencinin okuma becerisinin geliştirilmesine yönelik bir çalışma. *Kuramsal Eğitimbilim Dergisi*, 3(1), 124-134.