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An exploratory study of the relationships between reading comprehension competence, reading attitude and the vividness of mental imagery among Turkish fourth-grade students[*]

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Abstract

This study aimed to establish the possible relationships between reading comprehension competence, reading attitude and the vividness of mental imagery among Turkish fourth-grade students. Participants were fourth grade students, selected using convenience sampling from two different public schools (*n*=103) in Bartin, Turkey. The research was designed as a correlational study to describe the degree to which two or more quantitative variables are related; this was achieved by using a correlation coefficient. The data gathering tools used in this study were (1): the Reading Comprehension Test (RCT), which was developed by the researcher and which includes both factual and inferential questions; (2) the Vividness of Imagery Questionnaire (VIQ), developed by Sheveland (1992); (3) the Elementary Reading Attitude Survey (ERAS), developed by McKenna and Kear (1990). Multiple linear regressions were used for data analysis. The analysis revealed that reading attitude and vividness of mental imagery were significant predictors for students' reading comprehension competencies. In addition, the results indicated that approximately 14% of the variance in reading comprehension competence could be explained by reading attitude and vividness of mental imagery [R=.369, R^2=.136, $F_{(2\text{-}96)}$=7.578, p<.01].

Keywords: Reading comprehension competence, reading attitude, vividness of mental imagery, fourth-grade students

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Introduction

In recent years, research pertaining to reading comprehension has received much attention and has developed into one of the most popular areas where the act of reading is concerned (Aloqaili, 2012). According to a report by the National Reading Panel, published by the National Institute of Child Health and Human Development (NICHD) (2000), reading comprehension is identified as one of the five most important components in reading instruction.

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Most educators would agree that reading comprehension is extremely important (Jenkins, 2009). Mason (2004) claimed reading comprehension to be essential not only in academic learning, but also in life-long learning. Reading comprehension is viewed as the "essence of reading" (Durkin, 1993) and the "ultimate goal of reading education" (Nation, 2005).

Research indicates that a host of factors affect the reading comprehension process, e.g., the reader, text, working memory, context and vocabulary (Baumann, 2009; Snow, 2002; Stahl and Nagy, 2006). In addition, evidence from several sources and studies report a relationship between reading comprehension and reading attitude (Conlon, Zimmer-Bembeck, Creed & Tucker, 2006; Diamond & Onwuegbuzie, 2001; Martinez, Aricak & Jewell, 2008; McKenna, Kear & Ellsworth, 1995; Ogle, Sen, Pahlke, Jocelyn, Kastberg, Roey & Williams, 2003), and that mental imagery is an effective variable in the reading comprehension process (Bourduin, Bourduin & Manley, 1993; Gambrell & Bales, 1986; Gambrell & Jawitz, 1993; Jenkins, 2009; Kocaarslan, 2015; Oakhill & Patel, 1991; Rose, Parks, Androes & McMahon, 2000).

The focus of this research was the relationships between terms that included the following: reading comprehension, reading attitude and vividness of mental imagery. Theoretical explanations related to these concepts are outlined below.

Reading Comprehension

In the past and present, reading has been defined in many different ways. The term 'reading' has for many years in a narrow sense been used to refer to a set of print-based decoding and thinking skills that are necessary for understanding text (Harris & Hodges, 1981). Snow, Burns, and Griffin (1998) broadened this concept by denoting reading as a complex developmental challenge that we know to be intertwined with many other developmental accomplishments, e.g., attention, memory, language and motivation. Reading is not only a cognitive psycholinguistic activity, but also a social activity (p.15).

One of the most important skills learned by young students is the ability to understand written text, generally referred to as reading comprehension. Comprehension of the information within a text, or of its author's meaning, is the ultimate reason for reading (NICHD, 2000). Research studies on reading comprehension have revealed reading to be a complex cognitive activity that is crucial for adequate functioning and for obtaining information in current society, and a process that requires the integration of memory and meaning construction (Alfassi, 2004).

According to Woolly (2011), reading comprehension is the process of making meaning from text. The goal, therefore, is to gain an overall understanding of what is described in the text, rather than to obtain meaning from isolated words or sentences (p.15). Good readers have a purpose for reading and use their experiences and background knowledge to comprehend the text. Making connections is key to comprehension. We don't comprehend unless we make connections and are able to process the words that we read at a cognitive level (Tankersley, 2003, p.90).

The RAND Reading Study Group (2002) notes that comprehension is "the process of simultaneously extracting and constructing meaning through interaction and involvement with written language" (p.11). According to the RAND Reading Study Group (2002), reading comprehension consists of four components: (1) the reader; (2) the text; (3) the activity; (4) the situational context (p.1). The first three essential components – reader, text and task – occur within the fourth component of reading comprehension, i.e., the situational context. The reader is the one partaking in comprehending and the text is the reading material (e.g., stories, nonfiction selections, etc.). The specific activity refers to what type of

comprehension task, skill, strategy or concept the reader is attempting to perform (Reutzel & Cooter, 2012, p.259).

Vividness of Mental Imagery

Kosslyn (1980) interprets images as functional, quasi-pictorial representations, the special properties of which can affect cognitive processes and characterizes these quasi-pictorial representations as transitory data structures in quasi-pictorial representations as transitory data structures within an analogue spatial medium (p.91). Mental imagery refers to any image created in the mind without the presence of the real object or event, including images related to sight, sound, taste, touch, smell, sensations and feelings (Jenkins, 2009, p.3). Vivid mental imagery has been defined as the ability to create pictures in the mind's eye, a form of mental representation with visual properties, as well as a cognitive strategy used to form associations for learning, retrieval and problem-solving tasks (Hodes, 1990).

Research has distinguished vivid mental imagery as a significant contributor to meaningful reader-text interaction. Long, Winograd and Bridge (1989) describe imagery as a "naturally occurring part of the reading experience" (p.364). The "vividness" of mental imagery can determine the degree to which a person will undergo significant experiential, behavioural and physiological changes during cognition (Macomber, 2001). 'Vividness' is a word used to describe the extent to which a person's images are life-like. Developers of mental imagery measurements use a scale of vividness to determine how much elaboration or clarity a person has while imaging (Marks,1990), as well as the degree of strength, definiteness and intensity of images (Gordon, 1972).

Reading Attitude

Eagly and Chaiken (1993) state that "attitudes [are] a psychological tendency that [are] expressed by evaluating a particular entity with some degree of favour or disfavour" (p.1). Specifically, reading attitude is defined by Alexander and Filler (1997) as, "a system of feelings related to reading which causes the learner to approach or avoid a reading situation" (p.934). Similarly, Smith (1990) notes that reading attitude is "a state of mind, accompanied by feelings and emotions that makes reading more or less probable" (p.215). Both of these reading attitude definitions assume that the more positive the attitude towards reading, the more likely one will engage in reading activities. Positive attitudes have also been found to be associated with higher reading achievement (McKenna, Kear & Ellsworth, 1995).

As individual factors, the relationship between reading comprehension, reading attitude and vividness of mental imagery has been well-documented in the aforementioned research through the application of various correlational analyses, as well as through true experiments. However, there are no available studies examining the correlation between the three variables together. For this reason, the purpose of this study was to explore whether there was a significant correlation between reading comprehension competence, reading attitude and the vividness of mental imagery among fourth-grade students, as well as whether reading attitude and vividness of mental imagery were significant predictors of reading comprehension. The following research questions were examined in the current study.

- RQ1: is there a significant correlation between fourth-grade students' reading comprehension competence, reading attitude and the vividness of mental imagery?

- RQ2: what is the predictive level of fourth-grade students' reading attitudes and the vividness of mental imagery for their reading comprehension competence?

Method

This study was designed as a correlational study describing the degree to which two or more quantitative variables are related. It achieved this by using a correlation coefficient. In correlational research, the relationships among two or more variables are studied without any attempt to influence them (Fraenkel, Wallen & Hyun, 2012, p.331).

Subjects

The subjects in this study were 103 fourth-grade students, who were selected using convenience sampling from two different public schools in Bartın, Turkey, during the 2014-2015 academic year. Convenience sampling is a non-random sampling method that includes a group of individuals who (conveniently) are available for study (Fraenkel, Wallen & Hyun, 2012, p.99). The two public schools were similar in terms of physical environment, classroom sizes, student SES and parental education. Students were primarily from middle- and low-SES families. Among the subjects, 50 were girls and 53 were boys and the average age was 10.

Instruments

The data collection instruments used in this study were the Reading Comprehension Test (RCT) developed by Kocaarslan (2015), the Vividness of Imagery Questionnaire (VIQ) developed by Sheveland (1992) and the Elementary Reading Attitude Survey (ERAS) developed by McKenna and Kear (1990). Information about these instruments is given below.

Reading Comprehension Test (RCT)

The Reading Comprehension Test (RCT) developed by Kocaarslan (2015) comprises two texts that include both narrative and expository text, and a total of 20 open-ended questions related to these texts. The RCT is composed of open-ended questions aimed at understanding both factual and inferential knowledge related to the texts. The chosen texts were judged by four classroom teachers in accordance with a rubric. The rubric assessed the prior knowledge, word difficulty, sentence structure, punctuation and the grammar to be evaluated, according to students' grade level. According to assessments regarding the classroom teachers, both texts were judged appropriate for the fourth-grade level. For assessments made by the classroom teachers, Kendall's W coefficient of concordance was computed. Kendall (1955) presented this coefficient of concordance, W, to evaluate the extent of agreement among a set of judges, each of whom ranks in its entirety a set of objects. This statistic is well-known and has been widely used in socio-metric literature. The possible values for Kendall's W ranges from .00 (no agreement) to +1.00 (complete agreement). In this study, the coefficient demonstrated that there was statistically significant agreement among the judgments made by classroom teachers (*W*= .70, *p*<.01). When scoring the questions, two points were given for "complete and accurate answers", one point for "inadequate answers" and zero points for "incorrect answers". Two independent raters who specialized in reading education scored students' answers. The Cohen kappa coefficient, a statistic that measures inter-rater agreement for qualitative (categorical) items, was computed for each student's reading comprehension scores. Among two independent raters, Cohen's kappa coefficient (*K*) for students' reading comprehension scores in the current study ranged from .72 to .80. Altman (1991) suggests that the value of *K*, when ranging from .61 to .80, infers "good" in terms of strength of agreement. Furthermore, each reading text was prepared using an appropriate font, style and language for fourth-grade students.

Vividness of Imagery Questionnaire (VIQ)

The Vividness of Imagery Questionnaire (VIQ) developed by Sheveland (1992) and adapted into Turkish by Kocaarslan (2015) was employed for detecting the subject's clarity of mental imagery. This questionnaire instrument consists of 21 Likert items, each with five possible responses ranging from "very clear: vivid" (4-point) to "no image, just know" (0-point) and evaluates the vividness of evoked imagery according to seven sensory modalities: visual, auditory, coetaneous, kinaesthetic, gustatory, olfactory and organic (Sheveland, 1992; Kocaarslan, 2015). In the context of the current study, a Cronbach's alpha reliability coefficient for the questionnaire was computed as .91. A higher total score on the questionnaire indicates a higher level of vividness of mental imagery.

Elementary Reading Attitude Survey (ERAS)

The Elementary Reading Attitude Survey (ERAS) developed by McKenna and Kear (1990) and adapted into Turkish by Kocaarslan (2015) was employed to measure subjects' recreational and academic reading attitudes. The ERAS is a 20-item survey that is five pages long, with four questions on each page. A four-choice picture-rating scale is based on the 'Garfield' cartoon character. There are two 10-item subscales in this survey consisting of recreational and academic reading attitude. The ERAS provides a quick indication of student attitudes toward reading and can be administered to an entire classroom in roughly 10 minutes. Each item presents a brief, simply-worded statement about reading, followed by four pictures of Garfield. Each character pose is designed to depict a different emotional state, ranging from very positive to very negative. According to McKenna and Kear (1990), a pictorial format was selected due to its natural appeal to children and because of its comprehensibility by the very young. To score the survey, count four points for each leftmost (happiest) Garfield circled, three points for each slightly smiling Garfield, two points for each mildly upset Garfield and one point for each very upset (rightmost) Garfield. Three scores for each student can be obtained: the total for the first 10 items, the total for the second 10 and a composite total. The first half of the survey relates to attitudes toward recreational reading; the second half relates to attitudes toward academic aspects of reading. A total raw score of 50 represented the midway point on the scale, indicating a relatively indifferent attitude toward reading (McKenna & Kear, 1990). A Cronbach's alpha reliability coefficient for the survey in this study was calculated as .88.

Procedure

Three tests were administered to all students: the Vividness of Imagery Questionnaire (VIQ)*,* the Elementary Reading Attitude Survey (ERAS) and a reading comprehension test (RCT)". VIQ and ERAS were administered on the same day, while the RCT was applied one week after. Students were given 30 minutes to complete the VIQ and ERAS. For the RCT, students had 40 minutes (20 minutes for reading and 20 minutes for answering questions) to complete the test. Directions were read at the beginning of the test. First, students were given the narrative text and were allowed to read the text silently for 20 minutes. At the end of the 20 minutes, the narrative texts were taken from the students and question sheets were distributed. Students were given 20 minutes to answer the questions. A few minutes after all students had finished answering the questions related to the narrative text, other questions related to exposition were administered in a similar manner.

Statistical Analysis

The data collected during the study were analysed using SPSS version 21.0. Initially, descriptive statistics for variables in the study were determined. The relationships between VIQ, ERAS and RCT scores in the entire sample were examined using the Pearson product-moment correlation coefficient (*r*). Correlation analysis was employed to describe the

strength and direction of the linear relationship between two variables. The Pearson product-moment correlation coefficient (r) can only take on values ranging from -1 to +1. The sign out the front indicated whether there was a positive correlation (as one variable increases, the other decreases) or a negative correlation (as one variable increases, the other decreases). The size of the absolute value (ignoring the sign) provided an indication of the strength of the relationship. A perfect correlation of 1 or -1 indicated that the value of one variable can be determined exactly by knowing the value of the other variable (Pallant, 2007, p.126). Subsequently, a multiple regression analysis was conducted to determine the prediction level of subjects' reading attitudes and the vividness of mental imagery for their reading comprehension competences. Multiple regression does not consist of only one technique but a family of techniques that can be used to explore the relationship between one continuous dependent variable and a number of independent variables or predictors. Multiple regression is based on correlation, but allows for a more sophisticated exploration of the interrelationships among a set of variables (Pallant, 2007, p.146). In many applications, when researchers present multiple regression results, they also introduce bivariate and partial correlation results (Green & Salkind, 2005, p.283).

Results

Descriptive statistics for variables in the study were determined for the entire sample. These statistics such as mean (*M*), standard deviation (*SD*), skewness, and kurtosis are presented in Table 1. Additionally, normality assumption was checked using skewness and kurtosis values for the RCT, VIQ and ERAS scores, as summarized in Table 1. These values were between -2 and +2; that is, they were in the acceptable range (George & Mallery, 2001). Therefore, it can be said that all scores were normally distributed.

Table 1. *Descriptive statistics for variables in the study*

Variables	*M*	*SD*	Skewness	Kurtosis
RCT[a]	57.66	15.20	-1.905	1.324
VIQ[b]	71.59	11.82	-1.986	.158
ERAS[c]	69.67	7.98	-.868	.627

Note. RCT = Reading Comprehension Test; VIQ = Vividness of Mental Imagery; ERAS = Elementary Reading Attitude Survey. [a]*n*= 103. [b]*n*= 103. [c]*n*=103.

In this part of the research findings, initially, the correlation between subjects' RCT, ERAS and VIQ was calculated using the Pearson product-moment correlation coefficient (r) in order to first answer sub-questions of the research. The first sub-question of the research was expressed as, "Is there a significant correlation between fourth-grade students' reading comprehension competence, reading attitude and the vividness of mental imagery?" The results of this analysis are displayed in Table 2.

Table 2. *Bivariate correlations among study variables*

Variables		*1. RCT*	*2. ERAS*	*3. VIQ*
1.	RCT[a]	—		
2.	ERAS[b]	.315*	—	
3.	VIQ[c]	.237*	.340*	—

Note. RCT = Reading Comprehension Test; VIQ = Vividness of Mental Imagery; ERAS = Elementary Reading Attitude Survey. [a]*n*= 103. [b]*n*= 103. [c]*n*=103. Correlation is significant at the 0.01 level (*p*<.01).

As Table 2 demonstrates, Pearson product-moment correlation coefficients (r) between RCT and ERAS, RCT and VIQ, and ERAS and VIQ were .31 ($p<.01$), .23 ($p<.01$) and .34 ($p<.01$), respectively. Thus, there was a significant positive medium correlation between students' RCT and ERAS [$r=.31$, $p<.01$]. In other words, it can be stated that an increase in the total score of the reading attitudes affected students' reading comprehension competences positively and vice versa. Similarly, a significant positive medium correlation existed between students' ERAS and VIQ [$r=.34$, $p<.01$]. In other words, it can be stated that an increase in the total score of reading attitudes affected students' vividness of mental imagery positively and vice versa. Regarding the relationship between student's RCT and VIQ, there was a significant positive small correlation [$r=.23$, $p<.01$]. In other words, it can be stated that an increase in the total score of the vividness of mental imagery affected students' reading comprehension competencies positively and vice versa.

The second sub-question of the research was expressed as, "What is the predictive level of fourth-grade students' reading attitudes and the vividness of mental imagery for their reading comprehension competence?" Multiple linear regression analyses were conducted to answer the second sub-question of the research. The results of this analysis are displayed in Table 3.

Table 3. *Multiple regression analysis results*

Variables	B	Std. Error	β	t
Constant	1.277	14.762	—	.087
ERAS[a]	.473	.195	.245	2.430
VIQ[b]	.328	.161	.205	2.035

Note. R=.369, R^2=.136, $F_{(2-96)}$=7.578, $p<.05$. VIQ = Vividness of Mental Imagery; ERAS = Elementary Reading Attitude Survey. [a]n= 103. [b]n= 103.

As is shown in Table 3, the multiple regression analyses results revealed that reading attitude and vividness of mental imagery were significant predictors for students' reading comprehension competencies. In addition, the results indicated that approximately 14% of the variance in reading comprehension competence could be explained by reading attitude and vividness of mental imagery [$R=.369$, $R^2=.136$, $F_{(2-96)}=7.578$, $p<.05$].

Discussion

Reading comprehension underlines one of the most important aspects of reading education, given the role it plays in school achievement and daily life. The main aim of the present research was to explore the process of reading comprehension by analysing its relationship with the vividness of mental imagery and reading attitude.

In the this study, two questions were expressed regarding the relationship between measures of reading attitude, vividness of mental imagery and reading comprehension among Turkish fourth-grade children. In the first sub-question of the research, the correlation analyses showed that there was a significant positive medium relation between students' reading comprehension competencies and reading attitudes. This finding is consistent with previous study results that have indicated a positive correlation between reading comprehension and reading attitude scores (McKenna, Kear & Ellsworth, 1995; Conlon, Zimmer-Bembeck, Creed & Tucker, 2006; Martinez, Aricak & Jewell, 2008).

The relationship between attitudes toward reading and reading achievement has been clearly determined in multiple studies (Conlon, Zimmer-Bembeck, Creed & Tucker, 2006; Martinez, Aricak & Jewell, 2008; McKenna, Kear & Ellsworth, 1995; Ogle, Sen, Pahlke, Jocelyn, Kastberg, Roey & Williams, 2003). In each case, students with more positive reading attitudes tended to have higher achievement levels with regard to reading.

In McKenna, Kear and Ellsworth's research (1995), which is considered one of the landmark studies to have investigated the relationship between reading attitudes and other components of reading, findings revealed a positive correlation between students' reading attitudes and reading achievement. In addition, this research concludes that reading attitudes and achievement scores will have an impact on one another. To extend this work and further examine the relationship between reading attitudes and achievement, Martinez, Aricak and Jewell (2008) compared the scores of 76 fourth-graders as it concerned reading attitudes and reading achievement. Martinez, Aricak and Jewell (2008) obtained results that were compatible to those of McKenna, Kear and Ellsworth (1995). The findings of the current study are also consistent with a study by Ogle et al. (2003), which determined the strongest correlation between fourth-grade attitudes toward recreational reading and later achievement scores. In their study, Conlon, Zimmer-Bembeck, Creed and Tucker (2006) examined family histories and the cognitive abilities and attitudes of 190 elementary school students. The results of this study indicated a correlation between reading attitude and word recognition, comprehension and spelling skills. Diamond and Onwuegbuzie (2001) conducted a study to determine the factors associated with reading achievements and attitudes among elementary school-aged students. The results demonstrated a small but statistically significant relationship between reading achievement and attitudes toward reading. The results of these studies were in agreement with the findings of the current study.

The first sub-question of the present research also examined the relationship between students' reading comprehension and the vividness of mental imagery. A small yet significantly positive correlation was found between these two variables. This finding is supported by the results of previous studies by Bourduin, Bourduin & Manley (1993), Gambrell & Bales (1986), Gambrell & Jawitz (1993), Jenkins (2009), Kocaarslan (2015), Oakhill & Patel (1991) and Rose, Parks, Androes & McMahon (2000), which showed that students who employed mental imagery as a reading strategy performed better on reading assessments than students who did not. Researchers such as Goetz, Sadoski, Fatemi and Bush (1994) claim that mental imagery plays an important part in the complex task of reading.

The present study also evaluated the relationship between students' reading attitudes and the vividness of mental imagery. The current study's results showed a significantly positive medium correlation between these two variables. Several studies point to the relationship between mental imagery and text appreciation (Long, Winograd & Bridge, 1989; Macomber, 2001; Sadoski & Quast, 1990). Previous research has demonstrated significant correlations between vivid mental imagery created during reading and reading attitudes (Cramer, 1980; Irwin, 1979; Gunston-Parks, 1985; Macomber, 2001). Irwin (1979) reports that the reading attitudes of high school students were significantly correlated to self-reported vividness of mental imagery. Cramer (1980) employed elementary students and showed that a reader's general attitude toward reading was significantly related to comprehension, as well as imagery vividness. Macomber (2001) employed middle school participants and indicated that students with more vivid mental images had better attitudes towards reading.

Sadoski and Paivio (2001) claim that when students experience mental imagery, they tend to find the text more interesting, more comprehensible and more memorable. The second sub-question of the research investigated the predictive level of fourth-grade students' reading attitudes and the vividness of mental imagery for their reading comprehension skills. The multiple regression analyses results indicated that reading attitude and vividness of mental imagery were significant predictors of students' reading comprehension competencies. In addition, the results indicated that approximately 14% of the variance in reading comprehension competence could be explained by reading attitude and vividness of

mental imagery [R=.369, R^2=.136, $F_{(2-96)}$=7.578, p<.05]. In the above-mentioned research, it was found that reading attitude and vividness of mental imagery were significant variables for reading comprehension. Cramer (1980) found that a reader's general attitude toward reading was significantly related to a combined score for imagery vividness and comprehension. In his study, Kocaarslan (2015) conducted experimental research to investigate the effect of mental imagery instruction as a strategy for reading comprehension. The results demonstrated that fourth-graders who had been trained in mental imagery where the language arts were concerned had better scores on reading comprehension measures, as well as better reading attitudes. As shown, the present research findings are consistent with existing research literature.

Limitations of the Research and Directions for Future Research

This study emphasized the significance of the vividness of mental imagery in reading in terms of predicting reading comprehension. This variable has often been neglected in previous research. In this context, teachers should encourage students to create mental images during reading in order to better understand text. They should also endeavour to help students develop positive attitudes towards reading.

This study was limited to fourth-grade students only in Bartin/Turkey. For this reason, it cannot be said that participants represented the entire population. To achieve more comprehensive data, further research might involve students studying at different grades and a number of different variables such as word knowledge, reading motivation and prior knowledge.

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