Relationship Between Scientific Literacy and the Attitude Towards Reading Scientific Texts: A Study on Primary School Teacher Candidates

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Abstract

The current study sought to determine the association between primary school teacher candidates' levels of scientific literacy and their attitudes about reading scientific texts. The study used a correlational survey technique. The sample population consisted of 287 primary school teacher candidates who were enrolled in a public university in South-Eastern Anatolia's education faculty for the 2020–2021 academic year. The "Personal Information Form," "Universal Science Literacy Scale," and "Attitude Scale towards Reading Scientific Texts" were used to gather the data. During the data analysis stage, frequency and percentage values for the variables were determined. Correlation, simple regression, and multiple regression analyses were then performed. The results revealed that although teacher candidates' reading and scientific text reading rates were insufficient, their attitudes toward scientific literacy and scientific text reading were "good." The attitude toward reading scientific materials and the sub-dimensions of scientific literacy were found to be positively and statistically correlated. Along with the "habits of mind" and "meta-cognition and self-direction" sub-dimensions, it was also noted that scientific literacy is a statistically significant predictor of attitude toward reading scientific materials. Based on their findings, the researcher came up with several recommendations.

Keywords: Scientific Literacy, Attitude Towards Reading Scientific Texts, Correlation, Primary School Teacher Candidate

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INTRODUCTION

Countries that don't want to fall behind in the race for science and technology should prioritize providing their population with solid science education. Many nations that attempt to keep up with global studies have made the idea of scientific literacy the centerpiece of their educational objectives for this reason (Salcı, 2020). In summary, as scientific fields become more significant, the idea of scientific literacy has inevitably become necessary (Boujaoude, 2002). In order to avoid falling behind these achievements on the international stage, our nation has likewise made the required efforts to emphasize scientific literacy in its science curricula (Ministry of National Education [MoNE], 2018). As a result, this idea has been covered in the 2000 Science curriculum under the heading "literate in science," in the 2005 Science and Technology course curriculum under the heading "science and technology literate," and in the 2013 and 2018 Science course curricula under the heading "science literate." Furthermore, regardless of individual differences, it has been a goal of these curricula to guarantee that all students are trained as science-literate individuals. As they educate themselves and their pupils to be science-literate individuals, instructors have tasks and responsibilities that include developing the skills necessary for scientific literacy (Bacanak, 2002; Çepni and Bacanak, 2002; Işık Terzi, 2008). For the purpose of developing science-literate people, reading and writing exercises are carried out throughout the science learning process (Glynn and Muth, 1994).

Scientific Literacy

The ability to converse, read, and write about science is how the concept of scientific literacy is defined (Norris and Phillips, 2003). Miller (1983) claims that the idea of scientific literacy is divided into two elements. The first is a person's capacity to read and comprehend a scientific document. The other is functional scientific literacy, which shows that a person is capable of expressing ideas on science-related topics as well as having an appropriate understanding of those topics. The skills, knowledge, importance, and positive attitude toward science disciplines are all highlighted in the educational curricula, along with the connections between science and technology, society, and the environment (MoNE, 2005). While Choi et al., who consider each person a universal citizen, made a little modification to this idea and called it universal scientific literacy.

Attitude towards Reading Scientific Texts

Conceptually complex scientific texts differ greatly from fictional works in terms of both structure and content. It's possible for scientific literature to include graphs, tables, figures, formulas, and images. This kind of material enables readers to organize their scientific knowledge even if they have erroneous opinions or no background in the sciences. Scientific texts include, but are not limited to essays, scientific publications, and textbooks on chemistry, physics, and biology (Kumlu et al., 2017). Unquestionably, one of the most significant things influencing how people read these texts—which are very different from fiction—is how they feel about reading them. According to Petscher (2010), there is a positive correlation between reading attitude and academic success.

Scientific Literacy and the Attitude towards Reading Scientific Texts

According to Shamos (1995), there are three alternative methods to define scientific literacy: cultural scientific literacy, true scientific literacy, and functional scientific literacy. The simplest type of scientific literacy, known as "cultural science literacy," is the possession of the bare minimum of information. While accurate scientific literacy is the most challenging of all levels of scientific literacy. For proper scientific literacy, people should possess advanced understanding. When someone has effective scientific literacy, they can read a scientific paper or article and use scientific vocabulary to discuss it or communicate about it. Koch and Eckstein (1995) assert that people who are scientifically literate should be able to comment on a scientific text, identify the principal emphasis in these texts, and form an accurate and critical perspective on scientific materials. In addition to its cognitive component, scientific literacy also has an emotive component. In order to ensure that students develop a good attitude, it is important to boost their interest in and curiosity about science.

Even while it is not enough to raise scientifically literate people on its own, cultivating a positive attitude and enthusiasm for science is one of the most crucial aspects of scientific literacy (Çelik, 2016). In order to make wise decisions, it is crucial for people who are scientifically literate to first read and comprehend scientific resources and then critically evaluate the scientific contents in these references (Gökdemir, 2020). Furthermore, one of the three competencies outlined in the PISA 2015 scientific literacy framework, evaluating data and evidence scientifically, includes outlining the premises, reasoning, and conclusions in scientific texts (MoNE, 2016). This puts forth the importance of scientific texts in scientific literacy. Therefore, an individual who is able to identify the assumptions, findings, and logic in scientific texts should first be able to have a positive attitude towards reading such texts.

Relevant Literature

A review of local and international literature revealed that numerous investigations had been carried out to determine scientific literacy (Akdur, 2002; Chin, 2005; Corrigan, 2014; Dani, 2009; Heinsen, 2016; Huyugüzel Çavaş, 2009; Işık Terzi, 2008; Sarkar & Lee, 2001; Sülün, Işık, & Sülün, 2008; Süren, 2008). Majority of these studies have been performed with students and teachers. In addition, it was also observed that studies performed on teacher candidates had been conducted mostly on science teacher candidates (Bacanak, 2002; Can, 2007; Macaroğlu-Akgül, 2004; Özdemir, 2010) and that the number of studies on primary school teacher candidates is limited (Bacanak & Gökdere, 2009). There are few studies that concentrate on identifying the attitudes toward reading scientific textbooks (Harder, 1989), the attitudes of science teacher candidates toward reading scientific texts (Can & Öztürk, 2019), and the knowledge and attitudes of people related to reading from scientific texts, according to a national and international literature survey on studies that have focused on identifying the attitudes toward reading scientific texts (Nigro & Trivelato, 2012). In addition, studies on scientific and technological literacy levels and attitudes towards science (Yetişir, 2007); scientific attitude, and scientific literacy associating with daily life (Ürey & Cerrah Özsevgeç, 2015), along with studies examining the correlations between scientific literacy and science teaching self-efficacy belief (Uludüz, 2017) were identified when a literature survey was conducted for determining studies on other concepts that may be related with the scientific literacy of primary class teacher candidates. It is considered that teaching the science course to smaller age groups will contribute to the positive development of the interest and attitudes of students toward science and being scientific literate individuals starting from an early age (Uludüz, 2017). Science and primary school teachers undoubtedly play the most important role in increasing the scientific literacy of students (Huyugüzel Çavaş, 2009). A small amount of research has been published in the related literature to determine the levels of scientific literacy of primary class teacher candidates, but no studies have been done in the national literature to determine how teachers or teacher candidates feel about scientific materials. Additionally, there were no studies that looked at prospective teachers of primary classes' levels of scientific literacy and attitudes about reading scientific texts. Additionally, Peña and Paco (2004) noted that although students are interested in science and nature, they are not particularly eager to read scientific publications. The current study seeks to determine the levels of scientific literacy among primary school teacher candidates as well as their attitudes toward reading scientific texts. This is done in light of the fact that attitudes toward reading scientific texts are crucial for fostering the development of scientific literacy in children. Thus, answers have been sought to the following questions:

1. How frequently do teacher candidates read?

2. How frequently do teacher candidates read different kinds of texts (novels, short stories, poems, memoirs, history, politics, philosophy, health, personal development, science, religion)?

3. What are the perception levels of primary school teacher candidates towards scientific literacy and reading scientific texts?

4. Is there a statistically significant correlation between scientific literacy and its subdimensions and the attitude towards reading scientific texts?

5. Is scientific literacy a statistically significant predictor of the attitude towards reading scientific texts?

6. Are the subdimensions of scientific literacy statistically significant predictors of the attitude towards reading scientific texts?

METHOD

Study Model

A correlational survey model from among the general survey models was used in the present study that aims to examine the correlation between the scientific literacy states of primary school teacher candidates and their attitudes towards reading scientific texts. The reason for preferring this model was to measure two or more variables to put forth whether they are correlated or not (Lodico, Spaulding, & Voegtle, 2010). In the model, the attitude toward reading scientific texts was considered as the prediction that is the dependent variable, whereas scientific literacy and its subdimensions were considered as the predictor, that is, independent variables.

Population and Sample Group

The study population was comprised of 477 primary school teacher candidates continuing their education at two faculties of education of a state university in the South Eastern Anatolia Region during the 2020-2021 academic year. Target population was tried to be reached however, only 302 primary school teacher candidates stated that they would volunteer to take part in the study. Therefore, the sample group of the present study was comprised of 302 primary school teacher candidates selected based on the proper sampling method. Of these implemented scales, 287 were included in the analysis, as a result of which it was observed based on the calculations that the sample size (95 % confidence interval, α=.05 statistical significance) is sufficient (Field, 2009). Table 1 presents the participant data.

Table 1. Attributes of the Participants

Values	Groups	f	%
Gender	Female	208	72.50
	Male	79	27.50
Class level	1st grade	79	27.50
	2nd grade	61	21.30
	3rd grade	66	23.00
	4th grade	81	28.20
Age	17-18	7	2.40
	19-20	100	34.80
	21-22	114	39.70
	23-24	47	16.40
	25-26	12	4.20
	27 and above	7	2.40

It can be observed when Table 1 is examined that 72.50 % of the participants are female, and 27.50 % are male. Class levels indicate that 27.50 % of the participants are in 1st grade; 21.30 % in 2nd grade; 23.00 % in 3rd grade; 28.20 % in 4th grade. It was observed when age intervals were examined that 2.40 % of the participants were in the 17-18 age interval; 34.80 % in 19-20 age interval; 39.70 % in 21-22 age interval; 16.40 % in 23-24 age interval; 4.20 % in 25-26 age interval and 2.40 % in 27 and above age interval.

Data Collection Tools

"Personal Information Form", "Universal Science Literacy Scale" and "Attitude Scale Towards Reading Scientific Texts" were used for collecting data.

Personal Information Form: The personal information form prepared by the researcher includes information on the participants, such as gender, age, class level, and reading frequency.

Universal Science Literacy Scale: The universal science literacy scale was developed by Mun et al. (2015) and was adopted into Turkish by Çelik and Can (2017). The scale is comprised of 48 items, four dimensions (habits of mind, character, and values, science as human endeavor, metacognition, and self-direction), and eight factors. The scale is of a 5-point Likert type scale with values ranging between; (1) "I strongly disagree" to (5) "I strongly agree". The reliability of the scale was calculated using Cronbach alpha internal consistency coefficient; with the value determined as .91 for the general scale, as .85 for metacognition and self-direction dimension, as .81 for habits of mind dimension, as .79 for science as a human endeavor and as .76 for character and values dimension. In addition, CFA was conducted for the construct validity of the scale in order to identify whether the scale developed in another culture provides the same factor structure in the Turkish culture or not. The reliability-validity studies were repeated for the scale since a different sample group was used for the present study. The Cronbach alpha value calculated for the scale reliability was determined as .96 for the scale in general, as .93 for the metacognition and self-direction dimension, as .91 for the science as human endeavor dimension, as .87 for the character and values dimension. CFA was conducted for testing the construct validity of the scale. There is no consensus among the related researchers in the literature regarding which goodness of fit values should be reported. However, Kline (2016) states that it is sufficient to report the values of χ^2/df, *p*, CFI, RMSEA, and SRMR. Therefore, these values have been reported in the present study. The goodness of fit values for the model are; χ^2/df=1.884, *p*=0.00, CFI=0.886, SRMR=0.0501 and RMSEA=0.056. It can be stated that these acquired values are at an acceptable level (Gürbüz, 2019, s.34; Tabachnick and Fidell, 2013). Thus, the previously determined eight factor model was also verified with the study sample group.

Attitude Scale towards Reading Scientific Texts: The attitude scale towards reading scientific texts has been developed by Kumlu et al. (2017) for measuring the affective characteristics of students. The scale is comprised of 30 items and three factors (contribution of reading science texts to learning and skills, denial, and making use of science texts when possible). The scale is of a 5-point Likert type scale with values ranging between; (1) "I strongly disagree" to (5) "I strongly agree". Cronbach alpha internal consistency coefficient was calculated for scale reliability which was .94 for the whole scale in general, .92 for the making use of science texts when possible dimension, .92 for the denial dimension, and .86 for the contribution of reading science texts to learning and skills. CFA was conducted to identify the compatibility of the scale. The reliability-validity studies were repeated for the scale since the present study was conducted on a different study group. The Cronbach alpha values calculated for the reliability of the scale were calculated as .92 for the scale in general, .90 for the making use of science texts when possible dimension, .92 for the denial dimension, and .86 for the contribution of reading science texts to learning and skills. The goodness of fit values for the model was calculated as χ^2/df=2.231, *p*=0.00, CFI=0.896, SRMR=0.0720 and RMSEA=0.066 as a result of the repeated CFA. These acceptable values indicate that the predetermined three-factor model has also been verified for the sample group of the present study.

Data Analysis

Descriptive statistics, regression analysis, and the Pearson Product Moments correlation coefficient were calculated using SPSS 21.0, and the construct validity analysis (CFA) was performed using AMOS 21.0. Candidates for primary school teachers' scientific literacy and attitudes toward reading scientific texts were assessed using descriptive analysis, whereas the relationship between scientific literacy and its subdimensions and attitudes toward reading scientific texts was examined using correlation analysis. For the purposes of interpreting the correlation coefficients, the values

proposed by Pallant (2016) were taken into account (low correlation if the correlation coefficient is between= .10-.29; moderate correlation if the correlation coefficient is between=.30-.49; high correlation if the correlation coefficient is between= .50-1.0). In contrast to multiple regression analysis, which was used to determine the degree to which the dependent variable (attitude toward reading scientific texts) could be predicted by the independent variables (scientific literacy subdimensions), simple linear regression analysis was used to predict the attitude toward reading scientific texts by the state of scientific literacy. For both basic and multiple regression studies on the dataset, specific requirements must be met. Regarding simple linear regression analysis, it was found that the distribution is normally based on the findings of the normality test for the predictor (scientific literacy) and the predicted (attitude toward reading scientific texts) variables (skewness for scientific literacy -.235 and kurtosis -.310; skewness for the attitude towards reading scientific texts .226 and kurtosis -.458). Moreover, scatter diagram was examined, as a result of which it was observed that there is a linear correlation between the predictor and the predicted variables. Certain assumptions were checked prior to starting the multiple regression analysis. The fact that the VIF values ranging between 2.41 and 2.95 are below the value of 10 (Belsley, Kuh & Welsch, 1980), that the tolerance values in the .33 and .41 interval are above .20 (Field, 2009) and that the paired correlation coefficients for the dependent variables are below .80 (Tabachnick and Fidell, 2013) indicated that there is no multicollinearity issue in the dataset. In addition, outlier values were determined for 15 participants, which were excluded from the analysis to ensure that the dataset meets the normal distribution assumption. Thus, it was illustrated that the skewness and kurtosis values of the dependent (skewness .226 and kurtosis -.458 for the attitude towards reading scientific texts) and independent (skewness -.023 and kurtosis -.121 for the habits of mind dimension; skewness -.179 and kurtosis -.721 for the character and values dimension; skewness -.453 and kurtosis -.583 for the science as human endeavor dimension; skewness -.335 and kurtosis .094 for the metacognition and self-direction dimension) variables vary between – 1,5 and +1,5. Hence, it can be stated based on these values that the data are distributed normally (Tabachnick & Fidell, 2013). Moreover, it was also observed that the independent variables are distributed equally in the dependent variable (homoscedasticity) and that the errors are also distributed normally.

RESULTS

Reading Frequency of Teacher Candidates

The word cloud for the responses of primary school teacher candidates to the question, “How frequently do you read?” are presented in Figure 1.

Figure 1. Word Cloud for the Reading Frequency of Teacher Candidates

Figure 1 shows that the reading frequency of primary school teacher candidates is classified as every day (f=82), and once a week (f=75), every two days (f=53), once a month (f=48), once a year (f=25), and never (f=4).

Reading Frequencies of Teacher Candidates for Different Types of Texts

Table 2 presents the reading frequencies of primary class teacher candidates for different types of texts such as novels, short stories, poems, memoirs, history, politics, philosophy, health, personal development, science, and religion).

Table 2. Reading Frequencies of Teacher Candidates for Different Types of Texts

Text Types	Never		Rarely		Sometimes		Generally		Always	
	f	%	f	%	f	%	f	%	f	%
Novel	4	1.39	22	7.66	40	13.93	126	43.90	95	33.10
Short Story	23	8.01	65	22.64	110	38.32	71	24.73	18	6.27
Poem	50	17.42	75	26.13	87	30.31	37	12.89	38	13.24
Memoir	96	33.44	117	40.76	54	18.81	17	5.92	3	1.04
History	51	17.77	78	27.17	88	30.66	44	15.33	26	9.05
Politics	107	37.28	70	24.39	57	19.86	33	11.49	20	6.96
Philosophy	79	27.52	98	34.14	56	19.51	33	11.49	21	7.31
Health	78	27.17	105	36.58	69	24.04	22	7.66	13	4.52
Development	41	14.28	54	18.81	93	32.40	72	25.08	27	9.40
Science	80	27.87	111	38.67	65	22.64	21	7.31	10	3.48
Religion	44	15.33	86	29.96	86	29.96	39	13.58	32	11.14

According to Table 2, it is observed when the frequencies of primary school teacher candidates for reading different text types are examined that novels (f=95) are indicated most among the types of texts that are always read, whereas politics (f=107) is stated most frequently among the least read types of texts. Moreover, it was observed when the frequencies of reading scientific texts were examined that 38.67 % of the teacher candidates stated that they rarely read scientific texts, 27.87 % indicated that they never read scientific texts, 22.64 % stated that they sometimes read scientific texts, 7.31 % stated that they generally read scientific texts and 3.48 % indicated that they always read scientific texts.

Attitudes of Teacher Candidates towards Scientific Literacy and Reading Scientific Texts and Related Perception Levels

Table 3 shows the results of the descriptive analysis conducted for determining the attitudes of primary school teacher candidates towards scientific literacy as well as their attitudes and perceptions related to reading scientific texts.

Table 3. Descriptive Analysis of the Attitude towards Scientific Literacy and Reading Scientific Texts

Variables	N	$\overline{X}$	SS	Std. Error
1. Scientific Literacy	287	4.02	.51	.03
2. Attitude Towards Reading Scientific Texts	287	3.46	.57	.03

The fact that both scales were of a 5-point Likert type scale was taken into consideration when interpreting the arithmetic mean scores presented in Table 3. Hence, the scientific literacy states and attitudes towards reading scientific texts of the primary school teacher candidates who took part in the study were at a "good" level ($\bar{X}$= 4.02; $\bar{X}$= 3.46).

Correlation between Scientific Literacy and Its Subdimensions and the Attitude towards Reading Scientific Texts

Table 4 presents the results of the correlation analysis conducted to identify the correlation between the scientific literacy and subdimensions of primary school teacher candidates and their attitudes towards reading scientific texts.

Table 4. Correlation Coefficients Related with the Correlation between Scientific Literacy and Sub-Dimensions and the Attitude towards Reading Scientific Texts

Variables	1	2	3	4	5	6
1. Habits of the mind	1					
2. Character and values	.707**	1				
3. Science as human endeavor	.715**	.755**	1			
4. Metacognition and self-direction	.708**	.662**	.694**	1		
5. Scientific literacy	.883**	.866**	.901**	.881**	1	
6. Attitude towards reading scientific texts	.487**	.431**	.426**	.493**	.523**	1

**p<.01

The correlation coefficients presented in Table 4 reveal a positive and high level (r=.523, p<.01) of correlation between scientific literacy and the attitude towards reading scientific texts. In addition, there is a positive and moderate correlation between the attitude towards reading scientific texts and the habits of mind (r=.487, p<.01), character and values (r=.431, p<.01), science as human endeavor (r=.426, p<.01), metacognition and self-direction (r=.493, p<.01) subdimensions. Hence, it can be interpreted that an increase in the scientific literacy levels of primary school teacher candidates leads to the development of a positive attitude towards reading scientific texts, while a decrease in their scientific literacy levels results in developing a negative attitude towards reading scientific texts.

Prediction State of the Attitude of Reading Scientific Texts by the Scientific Literacy States of Primary School Teacher Candidates

Table 5 presents the results of the simple linear regression analysis conducted with regard to the prediction of the attitude toward reading scientific texts by the scientific literacy states of primary school teacher candidates.

Table 5. Results for the simple linear regression analysis conducted with regard to the prediction of the attitude of reading scientific texts by the scientific literacy states of primary school teacher candidates.

Variable	B	Standard Error	β	t	*p*
Constant	1.126	.228		4.929	.000
Science Literacy	.583	.056	.523	10.348	.000*
R=.523	R^2=.273				
$F_{(1,285)}$= 107.083	*p*=.000				

*p<.05

After doing a regression analysis to determine whether or not the level of scientific literacy has a statistically significant effect on one's attitude toward reading scientific materials, it was discovered that this attitude is predicted by scientific literacy (R=.523, R^2=.273, $F_{(1,285)}$= 107.083, p<.05). In addition, scientific literacy explains 27 % of the attitude towards reading scientific texts.

Prediction State of the Attitude towards Reading Scientific Texts by Scientific Literacy Subdimensions

Table 6 presents the multiple regression analysis results conducted for the prediction of the attitude towards reading scientific texts by the subdimensions of scientific literacy (habits of mind, character, and values, science as human endeavor, meta-cognition, and self-direction).

Table 6. Multiple Linear Regression Analysis Results for the Prediction State of the Attitude towards Reading Scientific Texts by Scientific Literacy Subdimensions

Variable	B	Standard Error	β	*t*	*p*
Constant	1.094	.233	-	4.701	.000
Habits of mind	.253	.092	.228	2.758	.006
Character and values	.073	.078	.079	.945	.345
Science as human endeavor	.013	.083	.014	.160	.873
Meta-cognition and self-direction	.257	.073	.273	3.500	.001
R= .535	R^2= .287	corrected R^2= .277			
F(4, 282)=28.330	*p*= .000				

It was observed as a result of the multiple linear regression analysis conducted to determine how variables such as habits of mind, character ,and values, science as human endeavor, meta-cognition, and self-direction predict the attitude towards reading scientific texts that the attitude toward reading scientific texts is predicted at a statistically significant level by the habits of mind (β=.228, t=2.758, p<.05) and meta-cognition and self-direction (β=.273, t= 3.500, p<.05) subdimensions of scientific literacy. In addition, it was also observed that the character and values (β=.079, t=.945, p>.05) and science as human endeavor (β=.014, t=.160, p>.05) subdimensions of scientific literacy are not statistically significant predictors of the attitude towards reading scientific texts. A 1 unit increase in the "Habits of mind" sub-dimension leads to an increase by .228 units in the attitude towards reading scientific texts. A 1 unit increase in the "Meta-cognition and self-direction" sub-dimension leads to an increase by .273 units in the attitude towards reading scientific texts. Of the attitude towards reading scientific texts, 27.0 % is explained by the habits of mind and metacognition and self-direction subdimensions of scientific literacy ($_{corrected}R^2$=.277; p<.05). In short, it can be stated based on the acquired findings that an increase in the "habits of mind" and "meta-cognition and self-direction" sub-dimensions of scientific literacy will contribute to ensuring that primary school teacher candidates will have a more positive attitude towards reading scientific texts.

DISCUSSION, CONCLUSION, AND SUGGESTIONS

The present study aimed to determine the correlation between the scientific literacy states of primary school teacher candidates and their attitudes towards reading scientific texts to identify the reading frequency of teacher candidates and the frequencies with which they read different text types. In the present study, 28,57 % of the teacher candidates stated that they read every day, 26,13 % indicated that they read once a week while 18,46 % read every two days, 16,72 % once a month, 8,71 % once a year, and 1,39 % stated that they never read. It was illustrated as a result of the study by Kuşdemir et al. (2020) with a sample group comprised of primary school and Turkish teacher candidates that 3 % of the participants stated that they last read six months ago, 11 % stated that they last read three months ago, 32 % stated that they read once a month, 27 % indicated that they read once a week while 25 % stated that they read every day. The number of teacher candidates who read every day and once a week is similar in both this study and the present study. These ratios were set forth in the study by Kolaç (2007) conducted with primary school teacher candidates as 39 % reading every day, 22,8 % every two days, 21 % once a week, 15,2 % every two weeks, 1 % once a month and 1 % stated that they do not remember. Hence, it can be indicated based on these percentages that the reading frequencies of primary school teacher candidates are not at a sufficient level in neither the aforementioned studies nor the present study. In addition, it was observed when the frequencies of reading different text types were examined that the teacher candidates always most frequently mentioned the *novel* (f=95), with *politics* indicated as the text type that is never read (f=107). The frequency of reading scientific texts illustrated that majority of the teacher candidates (66.54 %) stated that they rarely (38.67 %) or never (27.87 %) read scientific texts. Contrary to this study, Kolaç (2007) carried out a study as a result of which it was observed that the primary school teacher candidates mostly prefer books with adventure, social and emotional content; that they least prefer books with mystery and horror content with a frequency of preferring books with a scientific 8.4 %. Aslantürk (2008) conducted a study in which it was reported that primary school teacher candidates mostly prefer reading humor, art, newspapers, and magazines while they least preferred scientific books and

books on scientific and technical as well as culture books. According to a study by Arslantürk and Saracalolu (2010), teachers and teacher candidates prefer reading newspapers, novels, and short stories more than academic texts, technical manuals, books on science, and books with humor. The findings of both studies are consistent with the notion that people read novels more frequently than other types of literature, while they read scientific publications less frequently. Furthermore, despite the fact that primary school teacher candidates' favorite genres of books vary among research, it is notable that they dislike scientific books, even though these books have a high likelihood of including scientific materials. Future teachers' lack of interest in reading scientific texts will surely have a negative effect on their pupils' ability to do research and ask and answer questions. There could be numerous causes for this. The fact that applicants to primary class teaching programs are typically graduates of equally-weighted departments prevents them from taking enough science courses. Their previous negative attitudes toward the science course, and their perceptions of the difficulty of scientific texts may all be taken into account. The fact that teachers encourage their students to read short stories and novels, particularly during the primary school years, and that they also set aside more time to read such texts may be the reason why novels are identified as the most often read text category.

The current study found that teacher candidates have good levels of scientific literacy. Chin (2005) found that the scientific literacy levels of teacher candidates are typically at a satisfactory level after conducting a study with primary school and science teacher candidates. Uludüz (2017), however, reported that the scientific literacy levels of primary school teacher candidates are at a sufficient level. The conclusions of the current investigation are supported by these results. Additionally, a number of other research with differing conclusions were seen in the relevant literature. However, it has been noted that this research involved science teacher candidates. The scientific literacy levels of science teacher candidates are not at the intended level, according to studies by Bacanak (2002), Yakar (2010), and Yetişir (2007). However, Ulutaş (2009) and Özdemir (2010) suggested intermediate levels, while Can and Çelik (2019) and Salcı (2020) reported high levels. As a summary of this research, it can be shown that while the scientific literacy status is generally not at the desired level in studies carried out with science teacher candidates, it is found to be good in studies conducted with primary school teacher candidates. However, this conclusion is unexpected given that science teacher candidates enroll in more courses than primary school teacher candidates that will improve their scientific literacy. In the current study, teacher candidates had a positive attitude toward reading scientific texts. There are many studies in the related literature that aim to identify the attitudes of teacher candidates toward reading (Arslan, Çelik, Çelik & 2009; Bozpolat, 2010; Duman & Gökmen, 2018; Yılmaz & Benli, 2010;), while a limited number of studies was found that strives to determine the attitudes of teacher candidates towards reading scientific texts. Can and Öztürk (2019) examined the impacts of certain variables (gender, general grade point average, class level, reading frequency) on the attitudes of science teacher candidates towards reading scientific texts. Nigro and Trivelato (2012) carried out a study with students aged 14-15 to determine the knowledge and attitudes towards reading from different science disciplines, as a result of which it was observed that female students have higher scores compared with male students and that students who read scientific texts have higher scores compared with those who read textbooks. Research by Harder (1989) showed that adults have good opinions regarding reading science textbooks (anatomy and physiology). Therefore, no research has been done to directly assess teacher candidates' attitudes about reading scientific texts. It's also intriguing that the majority of the teacher candidates in the current study read scientific materials either occasionally or never, despite having a favorable attitude toward them. The likelihood that teacher candidates will favor reading scientific texts as future reading material, however, may be increased if they have a positive attitude toward reading scientific texts. When teacher candidates begin their careers, it may be said that those who adopt a good attitude toward reading scientific literature will more likely inspire their pupils to pursue science and study scientific texts.

In the current study, there was an association between scientific literacy and the mindset toward reading scientific texts that were favorable, significant, and statistically significant. During this time, it was also discovered that scientific literacy accounts for 27% of the attitude toward reading scientific texts and is a statistically significant predictor of that attitude. As a result, whereas a rise in teacher candidates' levels of scientific literacy enables them to acquire a favorable attitude toward

reading scientific texts, a drop in scientific literacy may cause them to do the opposite. In the relevant studies, no study was found that investigated the relationship between scientific literacy and reading attitudes toward scientific texts. Additionally, it is believed that students who approach scientific literature positively would also have a positive attitude toward science because of the scientific content. The few studies that have looked at the relationship between scientific literacy and attitude toward science in the relevant literature were analyzed in this regard. Ulutaş (2009) came to the conclusion that there is a positive and statistically significant association between scientific literacy and attitude toward science and that science teacher candidates' levels of scientific literacy and attitudes toward science are appropriate. While Yetişir (2007) showed in a prior study that there is a statistically significant and linear association between primary school and science teacher candidates' attitudes toward science and scientific literacy. According to research by Güçlüer (2012), boosting students' scientific literacy in the classroom has a favorable effect on their academic performance, attitude toward science, and scientific process skills. Yore et al. (2007) claimed that mathematics-literate people would experience a favorable change in their concerns, beliefs, and attitudes toward mathematics. For those who are literate in science, the same can be said. Thus, it can be concluded that people with high levels of scientific literacy will present a favorable attitude toward scientific materials, which are an essential component of these teachings. Assuring that pupils develop a good attitude toward science is one of the tasks and responsibilities of instructors for developing scientifically literate people, according to Bacanak (2002). Simply put, instructors who work hard to develop their students' scientific literacy or teacher candidates who are certain they will do so may help to ensure that their pupils have a favorable attitude toward science and reading scientific texts.

Additionally, there is a moderately favorable relationship between the attitude toward reading scientific literature and the sub-dimensions of the scientific literacy level that address habits of thought, character, and values, science as a human endeavor, meta-cognition, and self-direction. However, it was observed that only “habits of mind” and “meta-cognition and self-direction” variables from among the predictor variables are statistically significant predictors of the attitude towards reading scientific texts. The use of scientific procedures in the study of the world by an individual is a habit of mind that is also described as the capacity for questioning. Additionally, the scientific literacy scale's "systematic thinking/knowledge management" and "communication and cooperation" aspects are included in the habits of mind dimension. The reason for this was expressed as the fact that there is a need for individuals with problem-solving skills who can work in cooperation and communication due to the rapid scientific advancements that take place in the 21st century (Çelik, 2016). While cooperation skill is the capacity to work effectively and respectfully with various groups and carry out common duties, communication skill is the ability to effectively express opinions and ideas in different environments through written, verbal, or nonverbal communication skills, in addition to being a good listener (Trilling & Fadel, 2009). As a result, people with strong communication and cooperation skills may conduct group discussions, convey their ideas and opinions in a comfortable manner when evaluating scientific literature (such as textbooks, journals, articles, and texts), and appreciate the critical views of others. So it stands to reason that these people will read scientific texts with a more favorable perspective. According to Çelik (2016), the scientific literacy scale's systematic thinking/knowledge management factor aligns with the analytical thinking sub-learning area covered by the 2018 science course curriculum. Comparing two or more states, breaking a problem into manageable bits, articulating how you solved the problem, and criticizing and evaluating the characteristics of the target subject are all examples of analytical thinking (Sternbeg, 2006). In a nutshell, analytical thinking emphasizes accessing, analyzing, and extrapolating relevant information from facts connected to a subject (Gürkaynak et al., 2008). As a result, people with strong systematic or analytical thinking skills may quickly find a scientific text that suits their needs, break the problem down into smaller parts, make sense of it, and draw helpful conclusions from it. Therefore, it may be assumed that these people will read such scientific writings with high regard. The other aspects of meta-cognition and self-direction (habits of mind, character and values, and science as a human endeavor) are seen to play a unifying function (Choi et al., 2011). Additionally, the capacity for metacognition and self-direction is crucial for an individual to govern his or her own cognition while also being in charge of behavior and learning states (Ulas et al., 2015). Learning requires metacognition, and those who are adept at it perform better academically and exhibit more strategic

thinking (Coutinho, 2007). In this way, metacognitive awareness empowers students to organize, track, and evaluate their own learning. Therefore, those students who take on their own duties during the learning process may do so in a way that makes it easier for them to apply what they have learned to the challenges they run into and thus succeed (Schraw & Dennison, 1994). While self-direction refers to a person's capacity to manage their own ideas, feelings, and behaviors (Ulaş et al., 2015). It has been noticed that people with strong self-control achieve greater success, build stronger bonds with their friends, and behave less aggressively (Tangney et al., 2004). Accordingly, it can be concluded that students who have high levels of metacognition and self-direction awareness (i.e., those who are conscious of their learning processes and have self-control over their actions) are better able to identify the main idea of scientific texts and engage in scientific discussions with their peers. Therefore, it can be said that these people may have more positive attitudes toward scientific texts than their contemporaries. On the basis of the discovered information, the following recommendations might be made:

1. The participants in the current study were aspiring primary school teachers. The association between the states of scientific literacy and attitudes toward reading scientific texts of science teachers can be researched using various approaches since the notions of scientific literacy and the favorable attitude toward reading scientific texts are significant for science teachers.

2. According to the survey, both the frequency of primary school teacher candidates' reading and their frequency of reading scientific texts is below average. It may be ensured that the faculty or university libraries are better equipped with regard to scientific texts and publications in order to increase the reading frequencies and the frequencies of reading scientific texts of teacher candidates.

3. Having reading materials with scientific content at home, reading aloud to one another, and discussing the texts they read may help children develop positive attitudes toward reading scientific texts, especially when it is taken into account that parents play a significant role in ensuring that the habit of reading is instilled in the children from an early age.

4. The faculty or university may organize events (reading days, seminars, briefings on scientific books, author interviews, etc.) to motivate teacher candidates to read more.

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