The Assessment of the Validity and Reliability of the Three-Dimensional Contribution Scale in Adults and the Analysis of the Scale with Different Variables

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ARTICLE INFO	ABSTRACT
	This study has two aims: to examine the psychometric properties of the Three-Dimensional Contribution Scale in adults and to reveal how the contribution supports authenticity. To attain the first aim, a total of 198 individuals (105 females, 93 males) were included in the study. The result of the confirmatory factor analysis indicated that the scale maintained its three-factor structure. The internal consistency coefficient of the scale was determined to be .88. Regarding the criterion-related validity, a significant positive relationship was determined between the Three-Dimensional Contribution Scale and the Brief Resilience Scale. As a result, it can be said that the present scale is a valid and reliable measurement tool that can be used to determine contribution levels in adults. To accomplish the second aim of the study, a total of 383 individuals (184 females, 197 males, and two individuals with no sex specification) were enrolled in the study. The examination of the findings of the simple linear regression analysis of authenticity and the subscales of authenticity indicated that contribution supported the authentic living subscale of the authenticity positively. However, it was also found that contribution supported the self-alienation subscale of the authenticity negatively and that there was no significant relationship between the acceptance of external influences subscale and the total score of authenticity. In conclusion, it can be said that as the level of contribution increases, the authenticity of individuals will increase, as well.

1. Introduction

Psychology has been diversified and enriched by different theoretical approaches over time until today. Based on this change and development, human and development processes have been explained with various theoretical views (Işık, 2018). In this context, most research that is carried out in the field of psychology today relies on a positive psychology approach (Deci & Ryan, 2000; Seligman & Csikszentmihalyi, 2000; Sheldon, Ryan, Rawsthorne, & Ilardi, 1997; Wong, 2011).

Positive psychology prefers investigating the areas of human life that are open to development rather than those that are abnormal and dark (Seligman & Csikszentmihalyi, 2000). This approach, which has gradually increased its influence in the field of psychology (Wong, 2011), has as much paved the way for the development of new concepts and intervention methods (Salanova Soria & Gumbau, 2016), as providing the basis for revisiting previous concepts (Fromm, 2017; Harter, 2002; Yalom, 1980). In this respect, one of the

concepts studied in positive psychology is authenticity (Deci & Ryan, 2000; Sheldon, Ryan, Rawsthorne & Ilardi, 1997).

Authenticity, as it can also be expressed as one's self-knowledge (Maslow, 2010), is the manner in which a person shapes their life according to their feelings, thoughts, and values rather than the way dictated by society (Kernis & Goldman, 2006; Starr, 2008). Described as a person's true self (İlhan & Özdemir, 2013), authenticity was first coined by Heidegger (Kernis & Goldman, 2006). Later, this concept was defined as the true self and false self under one dimension (Sheldon, Ryan, Rawsthorne, & Ilardi, 1997). Authenticity was also defined based on theoretical approaches and studied as a triple structure by Barrett-Lennard (1998). Apart from these, some researchers also explained it by creating a model (Kernis & Goldman, 2006; Wood, Linley, Maltby, Baliousis & Joseph, 2008) And likewise, several studies on authenticity are found in the literature (Barrett-Lennard, 1998; Harter, 2003; İlhan & Özdemir, 2013; İmamoğlu, Günaydın, & Selçuk, 2011; Kernis & Goldman, 2006). According to the models created, research conducted, and theoretical views raised, this concept is associated with self, identity (Wood, Linley, Maltby, Baliousis, & Joseph, 2008), self-honesty, being open to people (Kernis, 2003), enjoying different experiences (Deci & Ryan, 2000), well-being, life satisfaction, ability to establish healthy relationships (Toor & Ofori, 2009), and altruism (İlhan & Özdemir, 2013). For example, Duman (2014) reported that there was a significant relationship between prospective teachers' authenticity and happiness. Investigating the partial mediation of spirituality between authenticity and happiness, Aydoğan, Özbay, & Büyüköztürk (2017) reported that spirituality had a partial mediating role. Apart from happiness, the relationship between authenticity and personality traits has also been looked into. In this context, Fleeson & Wilt (2010) found that authenticity was associated with emotional stability, extroversion, awareness, and compliance. Some studies in the literature have reported that authenticity is negatively related to some concepts, such as narcissism (Byrne & O'Brien, 2014).

Authenticity, which is stated to mostly improve one's life positively, helps people to establish successful relationships with the social structure that they are in (Geçtan, 2004). It is affected by individual, familial, and environmental factors (McGraw, 2001; Lopez & Rice, 2006). When the aforementioned three elements are healthy, the person achieves a high level of authenticity (Kernis & Goldman, 2005; Parmar & Rohner, 2005; Sağlam, 2012; Scaramella & Leve, 2004). Therefore, the person themselves, their family, and the social structure they belong to, play an important role in the development of that person. This situation, which has also been established by research, simultaneously helps the person to develop positively and affects them constructively in the spiritual sense (Elder & Shanahan, 2006; Gottlieb, Wahlsten, & Lickliter, 2006). In this way, the person realizes their self-regulation more healthily.

Self-regulation is a process that starts from the individual and moves on to their social environment (Gottlieb, Wahlsten & Lickliter, 2006), since humans are social beings. For this reason, if a person aims to exhibit a positive development, they should establish quality relationships with, both other people (Lerner, Dowling & Anderson, 2003) and themselves (Lerner, Lerner, Almerigi, Theokas, Phelps, Gestsdottir & vonEye, 2005). These relationships are established by mutual interaction (Jelicic, Bobek, Phelps, Lerner & Lerner, 2007). In this way, contributions made based on positive development will help create a healthier individual and society (Crocetti, Erentaitė & Žukauskienė, 2014). In fact, contribution helps people to know themselves better and develop a sense of belonging (Sherrod, Torney-Purta & Flanagan, 2010; Stukas, Daly & Clary, 2006). It is considered as one of the factors that helps an individual to develop positively (Youniss & Levine, 2009). With contribution, the person positively affects their self-development, the development of their family, and the community they live in (Truskauskaitė-Kunevičienė, 2015; Truskauskaitė–Kunevičienė & Kaniušonytė, 2018). This concept is also related to the characteristics of the person, such as competence, character, confidence, and self-regulation. There is a bulk of literature on the concept of contribution (Aldemir & Balcı-Çelik, 2020; Diener, 1994; Kaniušonytė & Žukauskienė, 2018; Lerner, Dowling & Anderson, 2003; Truskauskaitė - Kunevičienė, 2015; Truskauskaitė-Kunevičienė & Kaniušonytė, 2018). For instance, Kaniušonytė & Žukauskienė (2018) reported that positive relationships established with family members played an important role in the formation of a harmonious family and that the identity status partially mediated the formation of these relationships. Additionally, it was documented that the positive effect of the family supported the positive development of the child. Truskauskaitė-Kunevičienė (2015) found that life satisfaction and performing voluntary activities, positively predicted the contribution of men to themselves, family, and community.

When the literature was reviewed, it was found that there was no research investigating the concepts of authenticity and contribution together. The study of concepts, such as authenticity and contribution in individualist and collectivist cultures is important for the cross-cultural usefulness of these two concepts. Besides, as is known, the concept of contribution has been investigated by a limited number of studies in Turkish literature (Aldemir & Balcı-Çelik, 2020) and foreign literature (Diener, 1994; Kaniušonytė & Žukauskienė, 2018; Lerner, Dowling & Anderson, 2003; Truskauskaitė-Kunevičienė, 2015; Truskauskaitė-Kunevičienė & Kaniušonytė, 2018). For this reason, it is thought that the current study will contribute to the literature and help new research through different methods and techniques. For all these reasons, this study mainly aimed to reveal how the contribution levels of adult individuals in the Turkish culture supported their level of authenticity.

2. Method

2.1. Participants

We reached three different sample groups in this study. These sample groups were recruited from two different provinces located in the Central Black Sea Region. The first sample group (n = 198) was determined by Aldemir & Balcı-Çelik (2020) to validate the Three-Dimensional Contribution Scale (3DCON), which had been validated in adolescents, in the adult sample. The second sample group of the study (n = 383) was reached to reveal in what way the 3DCON supported authenticity. The third sample group was formed for test-retest reliability (n = 58). Accordingly, the study was carried out with a total of 637 adults, including 308 females (48.35%) and 329 males (51.65%). We reached enough participants for both study groups of the present study (Stevens, 1996, as cited in Seçer, 2015; Tinsley & Kass, 1979). There are various views in the literature about conducting validity and reliability analyses properly. For example, according to some views, it is necessary to reach a sample size of at least 10 times the number of items on the scale used (Tinsley & Kass, 1979, as cited in Seçer, 2015), or a data sampling of 5–20 times the number of items on the scale (Stevens, 1996).

2.2. Study 1

Participants in the first sample group of the study consisted of adults between the ages of 20–55 from various professions (n = 198). Within these, 105 (53%) of the participants were female, 93 (47%) were male, 91 (46%) were married, 107 (54%) were single, and 49 (24.7%) did not have any income. Regarding the monthly income levels, 10 of the participants (5.1%) were found to earn between TRY 500-1499, 23 (11.6%) of them between TRY 1500-2499, 14 (7.1%) of them between TRY 2500-3499, 31 (15.7%) of them between TRY 3500-4499, 29 (14.6%) of them between TRY 4500-5499, and 42 (21.2%) of them earned TRY 5500 or above.

2.3. Study 2

The second sample of the study consisted of 383 participants from various professions, which included 184 (48%) females, 197 (52%) males, and two with no sex specification (n = 383). Moreover, of the participants aged between 20 and 55, 246 (64.2%) were married, and 135 (35.3%) were single. Two participants did not state their marital status. For the second stage of the study, the third set of data was collected in the province for test-retest reliability; a total of 58 adults, consisting of 19 (32.8%) females and 39 (67.2%) males, were reached.

2.4. Data Collection Tools

In the study, three different scales were used for data collection. These scales were the Turkish form of the Three-Dimensional Contribution Scale (3DCON) developed by Truskauskaitė-Kunevičienė & Kaniušonytė (2018); the Turkish form of the Brief Resilience Scale (BRS) developed by Smith, Dalen, Wiggins, Tooley, Christopher, & Jennifer Bernard (2008); and the Turkish form of the Authenticity Scale developed by Wood, Linley, Maltby, Baliousis, & Joseph (2008). Further, a personal information form was used to collect data about the study group.

2.4.1. The Three-Dimensional Contribution Scale (3DCON): This scale was developed by Truskauskaitė-Kunevičienė & Kaniušonytė (2018) and adapted to the Turkish context by Aldemir & Balcı-Çelik (2020). It consists of 15 items and three subscales that measure individuals' contributions to themselves, their families, and the society they live in. It has a five-point Likert-type scale, and each item is scored using options ranging from 1 (strongly disagree) to 5 (strongly agree). There are no reversed items on the scale. For this reason, the total high scores obtained from the contribution-to-self subscale (Sample item: I think about who I want to be

in the future), the contribution to family subscale (Sample item: I share my knowledge with my family members), and the contribution to the community subscale (Sample item: I participate in voluntary work) indicate that the individual makes a high level of contribution, while low scores from these subscales show that the individual makes a low level of contribution. The lowest and highest scores that can be obtained from the scale range between 15 and 75. High scores obtained from the scale indicate a high level of contribution. McDonald's omega reliability/internal consistency coefficients for the contribution to self, the family, and the community subscale scores and the overall score of the scale were found to be .87, .89, .91, and .92, respectively. The internal consistency analysis was used to establish the reliability of the scale. The construct validity of the scale was calculated with the results of the confirmatory factor analysis (CFA). The content validity of the scale was established by six individuals who are experts in positive youth development (Truskauskaitė-Kunevičienė & Kaniušonytė, 2018).

2.4.2. The Brief Resilience Scale (BRS): This scale was developed by Smith et al. (2008) to measure the psychological resilience of individuals and adapted to the Turkish context by Doğan (2015). The BRS is a 5-point Likert-type, 6-item, and self-report measurement tool. Some of the items on the scale are reversed. High scores obtained from the scale indicate high psychological resilience. The development of the scale and its validity and reliability studies were conducted with four different study groups. The first two groups consisted of university students, and the other two groups included patients with heart disease and fibromyalgia. The exploratory factor analysis was conducted to determine the construct validity of the scale. As a result of the analysis, it was found that the scale had a single factor structure that explained 61%, 61%, 57%, and 67% of the total variance for the four different sample groups, respectively. The factor loadings of the scale items were found to vary between .68 and .91. The reliability of the scale was calculated with internal consistency and test-retest methods. Accordingly, the internal consistency reliability coefficient was found to vary between .80 and .91. The test-retest reliability coefficient varied between .62 and .69. Relationships between the BRS and other scales were examined within the scope of the criterion-related validity. Accordingly, significant positive relationships were found between the BRS and ego resilience, optimism, life goals, social support, positive coping strategies, and positive emotions. Also, significant negative relationships were found between the BRS and pessimism, depression, anxiety, negative emotions, perceived stress, and negative coping strategies.

2.4.3. The Authenticity Scale (AS): The 12-item Authenticity Scale developed by Wood, Linley, Maltby, Baliousis & Joseph (2008) was used to measure authenticity in this study. The scale consists of three subscales, namely "self-alienation," "acceptance of external influences," and "authentic living," and each item on the scale is scored between 1 and 7. The scale was adapted to the Turkish context by İlhan & Özdemir (2013). Psychometric studies of the Turkish form indicated that the scale had the same structure as the original form. In the Turkish adaptation study of the scale, Cronbach's alpha internal consistency coefficients were found to be $\alpha = 0.79$ for self-alienation, $\alpha = 0.67$ for acceptance of external influences, and $\alpha = 0.62$ for authentic living. During the development of the original form of the scale, the coefficients were found to be $\alpha = 0.78$ for self-alienation, $\alpha = 0.78$ for acceptance of external influences, and $\alpha = 0.69$ for authentic living. In the present study, the coefficients of the scale were 0.77 for self-alienation, 0.80 for acceptance of external influences, and 0.66 for authentic living.

2.5. The Process

In the present study, the Three-Dimensional Contribution Scale (3DCON), which was adapted to the Turkish context by Aldemir & Balcı-Çelik (2020), was initially tested for validity and reliability in adult individuals. For this step of the research, data was collected in a province in the Central Black Sea Region for the CFA. After the scale was proven to be a valid and reliable measurement tool in adult individuals, another set of data was collected in another city in the same geographical region for the criterion validity, test-retest reliability, and second-stage study of the 3DCON. Then, the raw data was transferred to the SPSS software package, and the gaps in the data set were filled-in using arithmetic mean scores. Afterward, an extreme value analysis was performed and thirty-one data, determined to be extreme in the second stage of the study, were deleted. The kurtosis and skewness coefficients of the items were examined with the normality test, and it was observed that the scale items were within a normal range (-3, +3).

2.6. Data Analysis

The validity of the scale was examined with the CFA and the criterion-related validity. In the CFA, modification recommendations were taken into consideration, and necessary corrections were made. For the goodness of fit indices of the 3DCON, the following values and the criteria in Table 1 were taken as a basis: RMSEA <.10 (Bentler & Bonett, 1980); CFI ≥.90 (Bentler, 1990); IFI ≥.90 (Bollen, 1989); GFI ≥.85 (Jöreskog & Sörbom, 1988); and AGFI ≥.80 (Marsh, Balla & McDonald, 1988). The reliability was calculated using Cronbach's alpha internal consistency coefficient. All validity and reliability analyses were conducted using the SPSS 24.0 and AMOS 22.0 software packages.

Table 1. *The goodness of fit indices*

GOODNESS OF FIT INDICES OF THE MODEL	GOOD FIT[1]	ACCEPTABLE FIT[1]
χ^2	$0 \leq \chi^2 \leq 2df$	$2df \leq \chi^2 \leq 3df$
χ^2/df	$0 \leq \chi^2/df \leq 3$	$3 \leq \chi^2/df \leq 4\text{-}5$
GFI	≥.90	.89-.85
AGFI	≥.90	.89-.85
CFI	≥.97	≥.95
IFI	≥.95	.94-.90
RMR	≤.05	.06-.08
RMSEA	≤.05	.06-.08

[1] *Kaynak: Karagöz (2016) and Meydan and Şeşen (2015).*

3. Findings

3.1.1. Findings on construct validity (Unrelated Model)

For the scale adaptation study, the CFA was conducted on the data collected from 198 participants within the scope of the construct validity study, through the SPSS 24.0 and AMOS 22.0 software packages, by using the maximum likelihood estimation method. In the analysis, the model fit indices showed that the data could be defined by a three-factor solution. As a result of the CFA conducted for the Turkish adaptation of the 3DCON, the correlations indicated that the goodness of fit indices (x^2 / df = 4.30; GFI =.80; RMR =.186; CFI =.73; IFI =.74; AGFI =.73; RMSEA = 13) were not at an acceptable level and that the factor construct of the scale did not yield acceptable statistical results for the Turkish culture.

3.1.2. Findings on construct validity (Relational Model)

For the scale adaptation study, the CFA was conducted on the data collected from 198 participants within the scope of the construct validity study, through the SPSS 24.0 and AMOS 22.0 software packages, by using the maximum likelihood estimation method. In the analysis, the model fit indices showed that the data could be defined by a three-factor solution. In line with the suggestions of the correction indices, the error covariance of the items 14 and 15 of the 3DCON were correlated. As a result of the CFA performed for the Turkish adaptation of the 3DCON, the correlations indicated that the goodness of fit indices (x^2/df=2.03; GFI=.90; RMR=.04; CFI=.92; IFI=.92; AGFI=.86; RMSEA=.07) were at an acceptable level and that the factor construct of the scale was valid and reliable for the Turkish culture (in adults). Figure 1 presents the model for the 3DCON.

As seen in Figure 1, all of the loading values of the items in the findings of the analysis were positive and significant. The loading values of the items varied between.34 and.79. The lowest loading value belonged to the item "I think about who I want to be in the future" (item 3), which is in the contribution-to-self subscale; while the highest loading value belonged to the item "I participate in voluntary work" (item 12), which is in the contribution to the community subscale.
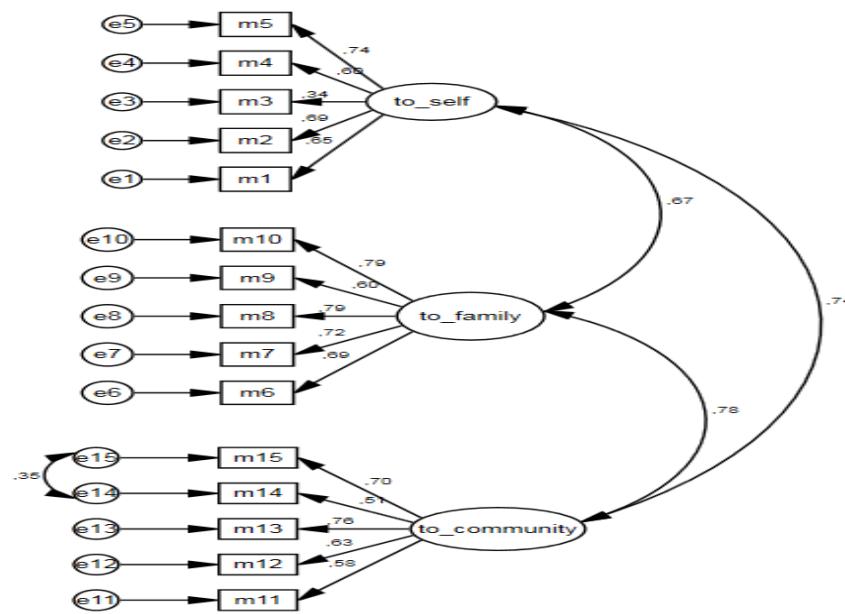
Figure 1. *Confirmatory Factor Analysis (Related Model)*

3.1.3. Criterion-Related Validity

For the criterion validity, the relationships between the scores obtained from the BRS (Doğan, 2015) and the scores obtained from the adapted Three-Dimensional Contribution Scale were examined. A significant correlation was found between the first collected data and the two forms (contribution-to-self subscale -BRS r =.28; contribution to family-BRS r =.08; contribution to community-BRS r =.15; 3DCON-BRS r =.22; p <.001).

3.2. Findings on Reliability

3.2.1. Internal consistency reliability

Cronbach's alpha internal consistency reliability coefficient of the Three-Dimensional Contribution Scale was examined. The coefficient was found to be.88. Cronbach's alpha internal consistency reliability coefficients of the subscales were.73,.83, and.77, respectively. According to the literature, these values were acceptable (Alpar, 2013; Kline, 2000). The results suggested that the internal consistency of the scale in the Turkish culture was close to its original form.

3.2.2. Item-Total Test Correlation

With the item-total test correlation, the relationship between each item on the scale and the total score was examined. The high correlation of each item with the total test score shows the consistency of the measurement tool (Tezbaşaran, 1997). There are studies in the literature that demonstrate the application of this criterion (Sakallı-Uğurlu, 2008). According to the results of the corrected item-total test score correlation analysis, the item-total test correlation values of the Three-Dimensional Contribution Scale ranged from.32 to.69.

Item-total test score correlations were also examined for the subscales. Accordingly, the corrected item-test correlation values were between.32 and.58 for the contribution-to-self subscale, between.54 and.70 for the contribution to family subscale, and between.49 and.64 for the contribution to community subscale. The minimum required value for the item-total test correlation is specified as.30 in the related literature (Kline, 2000). Accordingly, the item-total test correlation coefficients calculated both for subscales and the overall scale were found adequate.

3.2.3. Test-Retest Reliability

To check the time-dependent reliability of the 3DCON, the scale was administered to the same group of participants twice with a two-week interval. As a result of Pearson's correlation analysis, the test-retest reliability of the Three-Dimensional Contribution Scale was found to be.70 (n = 58, p <.001). Since the threshold limit for test-retest reliability was determined to be.70 according to Karakoç & Dönmez (2014), it can be said that the Three-Dimensional Contribution Scale had a satisfactory level of test-retest reliability. Some other

reliability analyses have also been used in various studies for test-retest reliability. To better reveal that the assessment tool made stable measurements, the paired samples t-test results were examined. According to the results, the p-value of the paired samples' t-test was greater than.01 (.68> 0.01), and no difference was found between the mean scores of the first collected data and the data collected from the same participants later. According to this result, the means of the first collected data ($\bar{x}$= 62.68) and the data collected later ($\bar{x}$= 63.02) were close to each other, which revealed that the scale was stable.

3.3. Findings on the Second Stage of the Study

In the first stage of the present study, the validity and reliability of the Three-Dimensional Contribution Scale in an adult sample in the Turkish culture were established. Then, in the second stage of the study, the manner in which contribution supported authenticity was investigated. The study results are given in Table 2, Table 3, Table 4, and Table 5.

Table 2. *The Result of The Regression for Total Authenticity Score*

	R	R²	Corrected R²	B	SH	B	*t*	*p*
Constant (Authenticity) Contribution	.06	.004	.001	-.07	.06	.06	1.1	.12

Table 2 presents the extent to which the authenticity variable predicted the contribution level according to the simple linear regression analysis. No significant result could be obtained as a result of this process.

Table 3. *The Result of The Regression for The Self-Alienation Level*

	R	R²	Corrected R²	B	SH	B	*t*	*p*
Constant (self-alienation) Contribution	.18	.03	.03	-.13	.04	-.18	-3.7	.000*

* p<.05

Table 3 presents the extent to which the self-alienation variable predicted the contribution level according to the simple linear regression analysis. As a result of this analysis, the values were found as follows: R =.18 and R2 =.03. As seen in the table, this variable explained 3% of the total variance in the contribution level.

Table 4. *The Result of The Regression for Acceptance of External Influences*

	R	R²	Corrected R²	B	SH	B	t	p
Constant (acceptance of external influences) Contribution	.03	.00	-.00	.02	.04	.03	.57	.56

* p<.05

Table 4 shows the extent to which the self-alienation variable predicted the contribution level according to the simple linear regression analysis. No significant result was obtained as a result of this analysis.

Table 5. *The result of The Regression for Authentic Living*

	R	R²	Corrected R²	B	SH	B	*t*	*p*
Constant (Authentic living) Contribution	.33	.11	.11	.18	.03	.33	6.9	.000**

** p<.001

Table 5 shows the extent to which the authentic living variable predicted the contribution level according to the simple linear regression analysis. As a result of this analysis, the following values were found: R =.33, R² =.11. As seen in the table, this variable explained 11% of the total variance in the contribution level.

Table 6. *Findings for the effect size and confidence intervals*

	$\bar{x}$	ES	95% Confidence interval	
			Lower limit	Upper limit
Constant (Authenticity)	47.44	.003	36.19	50.35
Constant (Self-alienation)	10.51	.033	14.37	23.47
Constant (Acceptance of external influences)	12.85	.0008	7.09	16.05
Constant (Authentic living)	24.07	.110	9.59	16.05

Table 6 presents the mean, effect size (ES), and confidence interval values of the constant variable and its subdimensions. As seen in Table 6, the x̄ values of the variable and its subdimensions varied between 10.51 and 47.44. Also, the values of the ES and the confidence interval ranged from .0008 to .110 and from 16.047 to 50.355, respectively.

4. Discussion, Conclusion, and Recommendations

This study aimed to investigate the psychometric properties of the Three-Dimensional Contribution Scale (3DCON), which was developed by Truskauskaitė-Kunevičienė & Kaniušonytė (2018) to measure the contribution levels of individuals and adapted to the Turkish context by Aldemir & Balcı-Çelik (2020), in adult individuals, and revealed how the contribution levels of adult individuals supported their authenticity levels.

The results of the adaptation study of the 3DCON, whose validity and reliability were investigated in adults, showed that the scale was valid and reliable enough to measure the contribution levels of adult individuals. In the study, first, the psychometric properties of the scale were examined by using CFA, calculations of test-retest and internal consistency coefficient, and criterion-related validity methods. The CFA was conducted to determine whether the three-factor structure of the original form of the scale could be preserved in a sample of adult individuals. According to the results, the goodness of fit indices were within an acceptable range (Karagöz, 2015). Thus, this showed that the three-factor structure of the scale was preserved in the sample consisting of adult individuals. The BRS was used to reveal the criterion-related validity of the scale. According to the correlation analysis conducted, the 3DCON was found to have a significant positive relationship with the BRS. In addition to these, the test-retest results (.70) and internal consistency coefficients (.88) of the scale were in the desired range (DeVellis, 2012; Nunnally & Bernstein, 1994), which showed that the measurements made by the tool were stable.

The findings showed that the contribution could be validated across cultures, but it did not have a significant relationship with the total authenticity score. It was theoretically supported that as the contribution score increased, the authenticity of the individuals would increase, as well; however, the current study could not reach a statistically significant result. According to the literature, statistical significance plays an important role in obtaining information about the population (Karagöz & Ekici, 2004). Nevertheless, the power of analysis and its role in reaching the population is not determined solely by statistical significance (Ellis, 2010; Murphy & Myors, 2004). When the present study was examined in terms of subscales, it was found that contribution negatively supported the self-alienation subscale of authenticity, yet it had no significant relationship with the acceptance of the external influences subscale. However, as theoretically expected, it was found that contribution positively supported the authentic living subscale. Studies revealing the relationship between these two concepts were not present in the literature. Yet, some studies attempted to reveal the correlation of these two concepts indirectly. For example, Wang (who divided authenticity into three types, namely dissociated, balancing, and egocentric) stated that a balancing authenticity was characterized by a sharing and emotional partnership (Wang, 2015). Byrne & O'Brien (2014) reported that people with authentic-high self-esteem had positive social relationships. In another study, Sağlam (2012) found that people with high authenticity also had high social desirability levels; although, according to the literature, authenticity and contribution affect the individual positively (Crocetti, Erentaitė, & Žukauskienė, 2014; Deci & Ryan, 2000; Toor & Ofori, 2009; Truskauskaitė-Kunevičienė, 2015; Youniss & Levine, 2009; Wood, Linley, Maltby, Baliousis & Joseph, 2008). It is also stated in the literature that authenticity is influenced by individual, familial, and environmental factors (McGraw, 2001; Lopez & Rice, 2006). Based on all this information, it can be said that the contribution levels of individuals affect their levels of authenticity. Likewise, it can be stated that individuals with high contribution scores will have high levels of authenticity. In other words, individuals' level of contribution is a factor that determines their authenticity levels.

In conclusion, establishing the validity and reliability of the 3DCON (which was proven in adolescents by Aldemir & Balcı-Çelik [2020]), in adult individuals increased the usefulness of the scale. Additionally, the validity and reliability study was conducted in people with different demographic characteristics. This affects the generalizability and usefulness of the scale positively. However, this study was conducted with only healthy individuals, which accounts for a limitation of the research. For this reason, examining the

3DCON with a sample of individuals with chronic diseases (heart, diabetes, blood pressure, etc.) or trauma will increase the generalizability and usefulness of the scale. Apart from this, the validity and reliability of the scale were studied with the data collected from two different provinces in the Central Black Sea Region. Therefore, future studies can include individuals from different geographical regions of Turkey to ensure more cultural diversity and increase the usability of the scale.

In the second phase of the present study, it was found that contribution predicted authenticity but that there was no statistical significance between the overall authenticity score and the acceptance of external influences subscale. Although research findings have shown the theoretical ties between the concepts, no statistical significance has been found. As is known, every scientific study has some limitations and errors, and this affects many factors, including the findings. At the same time, factors, such as the sensitivity level of the measurement tools employed in a study, the effect size, and sample size, also affect the study (Ellis, 2010; Murphy & Myors, 2004). For this reason, we preferred measurement tools with proven validity and reliability in the present study. Regarding the effect sizes of the study findings, though weak, there was an effect among the variables (Cohen, 1988), and 95% confidence intervals of the constant variables were also documented as indicated in Table 6. The criteria in the literature were taken into consideration in the selection of samples (Stevens, 1996; Tinsley & Kass, 1979). Despite all these, no statistical significance could be obtained in the present study. This may have been due to the sample size or the preferred measurement tools. The sample size is considered important for statistical significance (Ellis, 2010; Murphy & Myors, 2004), and every measurement tool has certain limitations (Krech & Crutchfield, 1967). With all these evaluations, it is thought that the findings in the present study will benefit meta-analysis studies. In addition, the findings of a single study cannot be seen as a complete criterion, and it is important to support or reject research findings with different study groups and measurement tools. Due to such reasons, it is important to investigate these concepts more comprehensively by using different research methods with different sample groups, where statistical significance can or cannot be achieved, and the theoretical ties can be supported. To generalize the results of the present study, we recommend that researchers should examine these concepts with different notions (such as well-being, life satisfaction, and the search for meaning) and the different fields of career counseling. In fact, conducting model studies with concepts that help the positive development of individuals will contribute to establishing more comprehensive ties between these concepts. Besides, these two concepts, authenticity and contribution, can be useful in the psychological counseling process and may be included in studies that will support the individual's positive development in school environments, which is one of the influencing factors of the individual.

The concept of authenticity has been addressed in domestic and international literature for a long time. However, the concept of contribution has recently been used in international literature, and it is a new concept in domestic literature. This concept focuses on the individual themselves and the context that they are in. For this reason, it is important to reveal the direction of the efficiency of contribution on the individual and the context in studies to be conducted with different study groups. Reflecting on this, it is considered that it will be beneficial to investigate the concept of contribution in scientific studies on society, married individuals, couples, and family processes. In fact, this concept should be used in counseling processes with individuals, groups, and families, and its effectiveness should be investigated, since how and where these resources will be used is as important as the individual's power sources. Moreover, the effectiveness of this concept should be investigated in studies to be conducted in the clinical field with experimental and quasi-experimental methods as the use of distinct methods and techniques in the emergence of different and effective intervention methods is considered important.

5. References

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An Investigation of Secondary School Students' Anxiety and Motivation Levels towards Science Course in Terms of Some Variables*

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ARTICLE INFO	ABSTRACT
	This work aims at studying the anxiety and motivation levels of secondary school students towards science course depending on gender, class levels, and their parents' level of education. In addition, it was aimed to examine the relationship between students' anxiety, motivation, and academic achievement towards science course. The study relies on a relational scannig model within the context of the general scannig model. The research sample consist of 629 students who continue their education at public secondary school in Kastamonu Province, Turkey, in the 2019-2020 academic year. Anxiety Scale for Science Course, Motivation Scale for Science Learning, Personal Information Form, and science grade for the end of the first semester were used as data collection tools in the research. The data obtained from the research were analyzed using the SPSS 22 program. As a result of this study, it is found out that the secondary school students' science anxiety levels were incredibly low but, their motivation levels towards science course were high. Also, it was observed that there was a significant relationship between students' science anxiety, science motivation and academic achievement. As to gender, it was determined that there was no significant difference between students' anxiety towards science course, and a significant difference between motivation towards science course. In addition, it was determined that students' anxiety and motivation towards science course differ significantly depending on class levels and their parents' level of education.

1. Introduction

In the teaching-learning process, the development of the students' affective characteristics is as important as the development of their cognitive characteristics (Duit, 1991; Turner & Lindsay, 2003). Existing literature emphasizes that the development of cognitive characteristics is at the forefront of the science learning process while affective characteristics are overlooked (Demirbas & Yagbasan, 2004; Duit, 1991; Turner & Lindsay, 2003). However, the objective of science course is that students acquire both cognitive characteristics such as understanding basic science concepts, scientific skills, problem-solving, and affective characteristics such as attitude, motivation and self-efficacy (Ministry of National Education [MoNE], 2018). Therefore, affective characteristics and cognitive characteristics need to be taken into account for better science education. This study investigates the correlation among the following three variables, i.e., anxiety, motivation, achievement.

One of the affective characteristics that affect the science learning process is anxiety. Anxiety can be defined as the state of unrest felt by the individual in the face of a threatening situation. This situation causes emotional

and physiological arousals in individuals (Hodgin, 2014). Science anxiety is the fear of science concepts, scientists and science-related activities (Mallow, 2006). The attitude of the family may cause science anxiety, the attitude of the teacher, the activities that are not suitable for the level of the student, the wrong perception of the lesson, the lack of role models, negative experiences, fear of exams and the social environment (Anderson & Clawson, 1992; Kaya & Yildirim, 2014; Mallow, 2006; Ucak & Say, 2019; Udo, Ramsey & Mallow, 2004). According to Wynstra (1991), science anxiety has six components: (1*) danger anxiety* (using toxic or flammable chemicals, conducting an explosive experiment or monitoring) (2) *test anxiety* (such as different types of test questions, laboratory tests) (3) *math and problem-solving anxiety* (graphic and table interpretation, problem-solving (4) *meticulousness anxiety* (taking blood from the finger, performing activities that some people do not like, such as investigating cockroaches) (5) *performance anxiety* (preparing a project and presenting the results to the class, being watched by the teacher when experimenting) (6) *science class anxiety* (It can occur while listening to lessons, taking notes). Mallow (2006) reported that science anxiety could be reflected in various ways, both physically and psychologically. Physically, students can have stomach pain, headache, sweaty palms, rashes, etc. Psychologically, students can display tension and nervousness by chewing nails, playing with hair, tapping foot, becoming distracted, etc. According to Oludipe & Awokoy (2010), anxiety can cause disturbing situations in students such as panic, fear, tension, helplessness, failure, difficulty breathing, loss of concentration. Studies have shown that low-level science anxiety is beneficial for learning, while high-level science anxiety prevents learning (Atwater, Gardner & Wiggins, 1995; Mallow, 2006) and decreases science achievement (Jegede, 2007; Osborne, Simon & Collins, 2003).

Another of the affective characteristics affecting the science learning process is motivation. Motivation can be defined as an internal state that stimulates, directs, and maintains targeted behaviour (Glynn, Taasoobshirazi & Brickman, 2009). Science motivation is that students participate actively in science lessons to perform higher (Lee & Brophy, 1996). Glynn, Taasoobshirazi & Brickman (2009) reported that motivation has six components: "intrinsic motivation, extrinsic motivation, self-efficacy, test anxiety, self-regulation and personal attention". According to Mubeen and Reid (2014), motivation depends on external factors such as *support, encouragement, rewards* and internal factors such as *self-confidence, determination, self-awareness*. According to Bonney, Kempler, Zusho, Coppola & Pintrich (2005), there are four main characteristics affecting motivation: *task awareness, interest, self-efficacy, goals of achievement*. Based on these factors in the literature, it can be said that motivation has a multivariable structure. Students with high motivation are more willing to participate in the lesson (Glynn, Taasoobshirazi & Brickman, 2009; Yenice, Saydam & Telli, 2012), make more effort in classroom activities (Wolters & Rosenthal, 2000), ask questions to learn and participate in group works eagerly (Glynn Taasoobshirazi & Brickman, 2009), do not give up until they reach the goal (Mubeen & Reid, 2014). Studies have observed that science motivation has a positive effect on science achievement (Bryan, Glynn & Kittleson, 2011; Nolen, 2003; Yildirim & Karatas, 2018).

1.1. The Importance of the Study

The PISA study means the ability to learn and read, expressing a text loudly, establishing a close relationship with the information in one or more texts given for a specific purpose by another reader. In addition to having specific competence in reading, it is expected that students will read for various purposes and have a high reading motivation (Organisation for Economic Co-operation and Development [OECD], 2019). The higher motivation and the less anxiety of the students towards the science course, the higher their success towards the science course in such international applications. According to PISA 2018, Turkey's average score in science literacy increased to 468, increasing 43 points compared to 2015. It is seen that Turkey has achieved the most remarkable improvement in science literacy compared to the previous period (MoNE, 2019).

It is a fact that the anxiety and motivation levels of secondary school students towards science course affect academic achievement in science courses (Akbas & Kan, 2007). It is essential to determine the anxiety and motivation levels of the students towards science course and the variables that affect them and take the necessary precautions. A review of studies on science anxiety in Turkey investigates the factors affecting students' science anxiety (Avci & Kirbaslar, 2017) and the role of anxiety as a predictor of secondary school students' self-learning skills (Kahyaoglu, Birel & Yetisir, 2019) were found. In addition, the relationship between science anxiety and attitude towards science lesson (Ulucinar-Sagir, 2012), science anxiety and mental risk-taking behaviours (Akca, 2017), anxiety towards science course and academic achievement (Avci & Kirbaslar, 2017), anxiety towards science course and science learning orientations (Yolagiden & Bektas, 2018)

was investigated. Various measurement tools have also been developed to determine students' science anxiety (Kagitci & Kurbanoglu, 2013; Ulucinar-Sagir, 2014; Yildirim, 2015). In some studies, with semi-experimental design, science anxiety levels of students were compared before and after the teaching (Guldal & Dogru, 2018; Yildiz, Simsek & Aras, 2017).

In most studies on science motivation, it was seen that students' science motivations were examined in terms of some variables (Demir, Ozturk & Dokme, 2012; Uzun & Keles, 2010; Yildirim & Karatas, 2018). In some studies, the science motivation scale was developed (Dede & Yaman, 2008) or adapted to Turkish (Yilmaz & Huyuguzel-Cavas, 2007). In addition, the relationship between science motivation and science achievement (Demir, Ozturk & Dokme, 2012; Yildirim & Karatas, 2018), learning styles, attitude towards science lesson and science motivation (Azizoglu & Cetin, 2009; Kahyaoglu & Pesen, 2013), learning strategies and science motivation (Cekim & Aydin, 2018), achievement, self-efficacy and science motivation (Ugras, 2018) was also investigated. The literature review reveals that there are many studies on science anxiety and science motivation in Turkey. However, a study investigating the relationship between science anxiety and science motivation of secondary school students (Muezzin & Ozata, 2019) was found. Muezzin & Ozata (2019) carried out some research in private schools in the Turkish Republic of Northern Cyprus. This work studies the relationship between science anxiety and science motivation of secondary school students. More research should be conducted to gather more reliable information on this topic. In this regard, it's aimed to contribute to the literature. In addition, it is thought that determining the possible factors that may affect students' science anxiety, and motivation will be beneficial for the organization of the learning environment.

1.2. The Aim of the Study

This work aims at studying the students' anxiety and motivation levels towards science course depending on gender, class levels, and their parents' level of education. In addition, it was aimed to examine the relationship between students' anxiety, motivation and achievement towards science course. In the present study, answers were sought to the following research questions:

1. What is the secondary school students' anxiety levels towards science course, and does it differ according to gender, class levels, mother's education levels and father's education levels?

2. What is the secondary school students' motivation levels towards science course, and does it differ according to gender, class levels, mother's education levels and father's education levels?

3. What are the relationships between the anxiety, motivation and academic achievement levels of secondary school students towards science course?

2. Methods

2.1. Model of the Study

The study was conducted using a relational screening model. This model is used to determine the presence and degree of covariation between two and more variables (Karasar, 2014). For research, quantitative data were collected with the Personal Information Form (PIF), Anxiety Scale for Science Course (ASSC), Motivation Scale for Learning Science (MSLS) and students' science course grades.

2.2. Participants

Participants of the research consist of 629 secondary school students in Kastamonu Province, Turkey in the 2019-2020 academic year. One of the researchers works at the school where the study was conducted. Therefore, the convenience sampling method was used to give speed and practicality to the research (Yildirim & Simsek, 2006). Demographic features of students such as gender, class levels, mother's and father's education levels are shown in Table 1.

According to Table 1, it is seen that 56.4% of the students are females and 43.6% are males. 23.8% of students are in 5th grade, 23.2% are in 6th grade, 28.5% are in 7th grade, 24.5% are in 8th grade. For the 23.8% of the students, the mothers are primary school graduates. For 30.7%, the mothers are secondary school graduates. The mothers for the 29.1% are high school graduates; 16.4% of the students had mothers with a graduate/postgraduate degree. The fathers are primary school graduates for 11.1%; secondary school

graduates for 23.8%; high school graduates for 39.6%. For the 25.4% of the students, the fathers had graduate/postgraduate degree.

Table 1. *Demographic Features of Students*

Variable	Category	f	%
Gender	Female	355	56.4
	Male	274	43.6
Class level	5th grade	150	23.8
	6th grade	146	23.2
	7th grade	179	28.5
	8th grade	154	24.5
Mother's education level	Primary school graduate	150	23.8
	Secondary school graduate	193	30.7
	High school graduate	183	29.1
	Graduate/postgraduate	103	16.4
Father's education level	Primary school graduate	70	11.1
	Secondary school graduate	150	23.8
	High school graduate	249	39.6
	Graduate/postgraduate	160	25.4

2.3. Data Collection Tools

2.3.1. Personal Information Form (PIF). It includes questions to determine the demographic features of students such as gender, class levels, and their parents' level of education.

2.3.2. Anxiety Scale for Science Course (ASSC). This scale was developed by Kagitci & Kurbanoglu (2013). The scale has a single factor structure and contains 18 items, all of which are positive. The Cronbach Alpha reliability coefficient of the scale was found .89 by Kagitci and Kurbanoglu (2013). In the current study, this value was found as .89. The scale is a five-point Likert scale and includes "never", "rarely", "often", "usually", "always" options. Starting from the "never" category, it was scored as 1-5, respectively. While the lowest score to be obtained from the scale is 18, the highest score is 90. The range of points taken into consideration to determine the anxiety levels of the students are as follows; *very low level* between "18-32.3", *low level* between "32.4-46.7", *medium level* between "46.8-61.1", *high level* between "61.2-75.5", *very high level* between "75.6-90".

2.3.3. Motivation Scale for Learning Science (MSLS). This scale was developed by Tuan, Chin & Shieh (2005) and adapted to Turkish by Yilmaz & Huyuguzel-Cavas (2007). The scale has a six-factor structure and contains 33 items, 25 of which are positive and 8 of which are negative. The Cronbach Alpha reliability coefficient of the scale was found .87 by Yilmaz & Huyuguzel-Cavas (2007). In the current study, this value was found as .91. This scale is a five-point Likert type scale and includes the options "I never disagree", "I disagree", "I am indecisive", "I agree", and "I totally agree". The positive statements in the scale were scored as 1-5, while the negative statements were scored reversely. While the lowest score to be obtained from the scale is 33, the highest score is 165. The range of points taken into consideration to determine the motivation levels of the students are as follows; *very low level* between "33-59.3", *low level* between "59.4-85.7", *medium level* between "85.8-112.1", *high level* between "112.2-138-5", *very high level* between "138.6-165".

2.3.4. Students' Science Course Grades. As a criterion of academic achievement, students' science course grades were taken into consideration. The students' report grades for science course were taken from the school administration end of the first semester. Report grades are classified as low, medium and high. 0-44 points are classified as low; 44-69 points are classified as medium, and 70-100 points are classified as high. The scales were applied face-to-face by the researchers at the school in January-February 2020.

2.4. Analysis of the Data

The SPSS 22 program was used for analysis. Frequency and percentage were used to analyze demographic features, and arithmetic mean was used to determine the students' anxiety and motivation levels. Since the data obtained from the science anxiety and motivation scale showed normal distribution, parametric tests were used to analyze the data. Whether the students' science anxiety and motivation levels differ by gender were analyzed by independent t-test, and whether they differed by class and parents' education levels were analyzed by one-way ANOVA test. When group variances are equal, and the number of groups is high, the

Tukey test can be used (Buyukozturk, 2004; Can, 2013). The correlation coefficient shows the level of the relationship as follows; *the low-level relationship* between ".00-.30", *the medium level relationship* between ".30-.70", the *high-level relationship* between ".70-1.00". The significance of *the p* value was evaluated at the level of .01 in the correlation analysis and at the level of .05 in the other analysis.

3. Results

In this section, the findings from the scales are arranged and interpreted based on each research question.

An independent t-test was applied to determine whether the students' anxiety levels differ according to the gender, and the results are shown in Table 2.

Table 2. *T-Test Results Analysing Students' Anxiety Scores in Terms of Gender*

Gender	N	$\bar{X}$	SS	SD	t	*p*
Female	355	29.96	10.79	627	-.68	.492*
Male	274	30.57	11.33			

*p>.05

As seen in Table 2, there was no significant difference between the students' anxiety scores in terms of gender [t(627)= - .68; *p*> .05]. A review of Table 2 suggests that the secondary school students' mean anxiety scores towards science course are 30.26. This finding indicates that the students have low level according to the ASSC.

Table 3 presents analysis results identifying whether students' anxiety scores differ depending on class and parents' education levels.

Table 3. *Descriptive Statistics Results Students' Anxiety Scores in Terms of Class Levels and Parents' Education Levels*

Variable	Category	N	$\bar{X}$	SS
Class level	5th grade	150	30.04	12.26
	6th grade	146	28.96	9.68
	7th grade	179	28.96	8.52
	8th grade	154	33.09	12.94
Mother's education level	Primary	150	33.47	13.12
	Secondary	193	29.69	9.47
	High	183	28.76	10.47
	Graduate/postgraduate	103	29.12	10.57
Father's education level	Primary	70	32.61	11.90
	Secondary	150	31.34	11.44
	High	249	29.91	11.10
	Graduate/postgraduate	160	28.64	9.87

According to Table 3, science anxiety scores for the 5th graders are 30.04, the 6th graders are 28.96, the 7th graders are 28.96 and the 8th graders are 33.09. Therefore, the highest anxiety scores belong to the 8th graders, while the lowest scores belong to the 6th and the 7th graders.

According to Table 3, the mean scores of science anxiety of the students whose mothers are primary school graduate is 33.47, secondary school graduate is 29.69, high school graduate is 28.76, and graduate/postgraduate is 29.12. The mean scores of science anxiety of the students whose fathers are primary school graduate is 32.61, secondary school graduate is 31.34, high school graduate is 29.91, and graduate/postgraduate is 28.64.

Accordingly, the highest mother's education level belongs to primary school graduate, while the lowest score belongs to high school graduate. Similarly, the highest father's education level belongs to primary school graduate, while the lowest score belongs to graduate/postgraduate.

Table 4 shows analysis results identifying whether students' anxiety scores differ depending on class levels, mother's and father's education levels. One-way ANOVA was applied to determine whether there is a significant difference between the mean scores of science anxiety and the analysis results in Table 4.

According to Table 4, there was a significant difference between students' science anxiety mean scores in terms of class levels ($F_{(3-625)}$=4.990; *p*< .05), the education levels of mother ($F_{(3-625)}$=6.036; *p*< .05), the education levels of father ($F_{(3-625)}$=2.799; *p*< .05).

Table 4. *One-way ANOVA Results Analysing Students' Anxiety Scores in Terms of Their Class Levels and Parents' Educational Levels*

Variable	Source of variance	Squares sum	SD	Squares average	F	p
Class level	*Inter group*	1787.156	3	595.719	4.990	.002*
	In group	74618.956	625	119.390		
	Total	**76406.112**	**628**			
Mother's education level	*Inter group*	2151.499	3	717.166	6.036	.000*
	In group	74254.612	625	118.807		
	Total	**76406.111**	**628**			
Father's education level	*Inter group*	1012.802	3	337.601	2.799	.039*
	In group	75393.309	625	120.629		
	Total	**76406.111**	**628**			

*p<.05

Tukey test was carried out to determine which group the difference originated from and the results are shown in Table 5.

Table 5. *Tukey Test Results Analysing Students' Anxiety Scores in Terms of Their Class Levels and Parents' Educational Levels*

Variable	Category		The difference between the mean scores	SS	p
Class level	5th grade	6th grade	1.080	1.27	.830
		7th grade	1.085	1.20	.806
		8th grade	-3.044	1.25	.043*
	6th grade	5th grade	-1.080	1.27	.830
		7th grade	.004	1.21	1.00
		8th grade	-4.125	1.26	.006*
	7th grade	5th grade	-1.085	1.20	.806
		6th grade	-.004	1.21	1.00
		8th grade	-4.130	1.20	.003*
	8th grade	5th grade	3.044	1.25	.043*
		6th grade	4.125	1.26	.006*
		7th grade	4.130	1.20	.003*
Mother's education level	Primary	Secondary	3.779	1.18	.008*
		High	4.708	1.20	.001*
		Graduate/postgraduate	4.347	1.39	.010*
	Secondary	Primary	-3.779	1.18	.008*
		High	.929	1.12	.842
		Graduate/postgraduate	.568	1.33	.974
	High	Primary	-4.708	1.20	.001*
		Secondary	-.929	1.12	.842
		Graduate/postgraduate	-.361	1.34	.993
	Graduate/postgraduate	Primary	-4.347	1.39	.010*
		Secondary	-.568	1.33	.974
		High	.361	1.34	.993
Father's education level	Primary	Secondary	1.267	1.58	.856
		High	2.702	1.48	.265
		Graduate/postgraduate	3.970	1.57	.047*
	Secondary	Primary	-1.267	1.58	.856
		High	1.435	1.13	.586
		Graduate/postgraduate	2.702	1.24	.134
	High	Primary	-2.702	1.48	.265
		Secondary	-1.435	1.13	.586
		Graduate/postgraduate	1.267	1.11	.665
	Graduate/postgraduate	Primary	-3.970	1.57	.047*
		Secondary	-2.702	1.24	.134
		High	-1.267	1.11	.665

*p<.05

As seen in Table 5, there was no significant difference between anxiety scores of 5th, 6th and 7th grades. However, there was a significant difference between 5th and 8th grades, 6th and 8th grades, and 7th and 8th grades.

The science anxiety mean scores of the 8th grades were significantly higher than the other class levels. There was no significant difference between anxiety scores of students whose mothers have a secondary school, high school or graduate/postgraduate degree. However, the anxiety means scores of the students whose mother graduated from primary school were significantly higher than the students whose mother graduated from other education levels. There was no significant difference between the anxiety scores of students whose fathers have a secondary school, high school or graduate/postgraduate degree. There was only a difference between the students whose fathers have primary school degrees and those whose fathers have graduate/postgraduate degrees. The anxiety means scores of the students whose fathers are primary school graduate was significantly higher.

An independent t-test was applied to determine whether the students' motivation levels differ according to gender, and the results are shown in Table 6.

Table 6. *T-Test Results Analysing Students' Motivation Scores in Terms of Gender*

Gender	N	x̄	SS	SD	t	*p*
Female	355	128.94	17.94	627	4.004	.000*
Male	274	122.71	21.03			

*p<.05

As seen in Table 6, there was a significant gender-based difference between the students' motivation scores [$t(627)= 4.004$; *p*< .05], in favour of the female students. A review of Table 6 reveals students' mean motivation scores towards science course is 125.82. This result shows that students have a high level according to the MSLS.

Table 7 presents analysis results identifying whether students' motivation scores differ depending on class levels, parents' education levels.

Table 7. *Descriptive Statistics Results Students' Motivation Scores in Terms of Class Levels, Parents' Education Levels*

Variable	Category	N	x̄	SS
Class level	5th grade	150	127.56	20.44
	6th grade	146	128.08	19.75
	7th grade	179	127.76	15.23
	8th grade	154	121.40	22.26
Mother's education level	Primary	150	122.24	20.12
	Secondary	193	125.26	18.21
	High	183	126.69	19.75
	Graduate/postgraduate	103	133.02	19.38
Father's education level	Primary	70	121.27	19.13
	Secondary	150	123.04	19.93
	High school graduate	249	125.83	18.86
	Graduate/postgraduate	160	132.00	19.33

According to Table 7, motivation scores for the 5th graders are 127.56, the 6th graders are 128.08, the 7th graders are 127.76 and the 8th graders are 121.40. Therefore, the highest science motivation scores belong to the 6th graders, while the lowest scores belong to the 8th graders.

As seen in the Table 7, the mean scores of science motivation of the students whose mothers are primary school graduate is 122.24, secondary school graduate is 125.26, high school graduate is 126.69 and graduate/postgraduate is 133.02. The mean scores of science motivation of the students whose fathers are primary school graduate is 121.27, secondary school graduate is 123.04, high school graduate is 125.83 and graduate/postgraduate is 132.00.

Accordingly, the highest mother's education level belongs to graduate/postgraduate, while the lowest score belongs to primary school graduate. Similarly, the highest father's education level belongs to graduate/postgraduate, while the lowest score belongs to primary school graduate.

Table 8 presents analysis results identifying whether students' motivation scores differ depending on class levels, mother's education levels and father's education levels. One-way ANOVA was applied to determine whether there is a significant difference between the mean scores of science motivation and the results of the analysis are shown in the Table 8.

Table 8. *One-Way ANOVA Results Analysing Students' Motivation Scores in Terms of Their Class Levels ad Parents' Educational Levels*

Variable	Source of Variance	Squares Sum	SD	Squares Average	F	*p*
Class level	*Inter group*	4776.953	3	1592.318	4.216	.006*
	In group	236035.158	625	377.656		
	Total	**240812.111**	**628**			
Mother's education level	*Inter group*	7366.986	3	2455.662	6.575	.000*
	In group	233445.126	625	373.512		
	Total	**240812.112**	**628**			
Father's education level	*Inter group*	8606.021	3	2868.674	7.721	.000*
	In group	232206.090	625	371.530		
	Total	**240812.111**	**628**			

*p<.05

As seen in Table 8, there was a significant difference between students' science motivation mean scores in terms of class levels ($F_{(3-625)}$=4.216; $p<.05$), the education levels of mother ($F_{(3-625)}$=6.575; $p<.05$), the education levels of father ($F_{(3-625)}$=7.721; $p<.05$). Tukey test was carried out to determine which group the difference originated from and the results are given in Table 9.

Table 9. *Tukey Test Results Analysing Students' Motivation Scores in Terms of Their Class Levels and Parents' Educational Levels*

Variable	Category		The difference between the mean scores	SS	*p*
Class level	5th grade	6th grade	-.522	2.25	.996
		7th grade	-.205	2.15	1.000
		8th grade	6.157	2.22	.030*
	6th grade	5th grade	.522	2.25	.996
		7th grade	.316	2.16	.999
		8th grade	6.679	2.24	.016*
	7th grade	5th grade	.205	2.15	1.000
		6th grade	-.316	2.16	.999
		8th grade	6.362	2.13	.016*
	8th grade	5th grade	-6.157	2.22	.030*
		6th grade	-6.679	2.24	.016*
		7th grade	-6.362	2.13	.016*
Mother's education level	Primary	Secondary	-3.029	2.10	.475
		High	-4.453	2.12	.157
		Graduate/postgraduate	-10.789	2.47	.000*
	Secondary	Primary	3.029	2.10	.475
		High	-1.424	1.99	.891
		Graduate/postgraduate	-7.759	2.35	.006*
	High	Primary	4.453	2.12	.157
		Secondary	1.424	1.99	.891
		Graduate/postgraduate	-6.335	2.38	.040*
	Graduate/postgraduate	Primary	10.789	2.47	.000*
		Secondary	7.759	2.35	.006*
		High	6.335	2.38	.040*
Father's education level	Primary	Secondary	-1.775	2.79	.920
		High	-4.567	2.60	.298
		Graduate/postgraduate	-10.728	2.76	.001*
	Secondary	Primary	1.775	2.79	.920
		High	-2.792	1.99	.499
		Graduate/postgraduate	-8.953	2.19	.000*
	High	Primary school graduate	4.567	2.60	.298
		Secondary school graduate	2.792	1.99	.499
		Graduate/postgraduate	-6.160	1.95	.009*
	Graduate/postgraduate	Primary	10.728	2.76	.001*

Secondary	8.953	2.19	.000*
High	6.160	1.95	.009*

*p<.05

As seen in Table 9, there was no significant difference between science motivation scores of the 5th, the 6th and the 7th grades. However, there was a significant difference between the 5th and the 8th grades, the 6th and 8th grades, and the 7th and the 8th grades. The science motivation mean scores of the 8th grades were significantly lower than the other class levels. There was no significant difference between science motivation mean scores of students whose mothers are primary school, secondary school or high school graduates. However, science motivation mean scores of the students whose mothers have graduate/postgraduate degree was significantly higher than the mean scores of the students with mothers from other education levels. There was no significant difference between the science motivation scores of students whose fathers are primary school, secondary school, or high school graduates. Science motivation mean scores of the students whose fathers have graduate/postgraduate degree was significantly higher than the mean scores of the students with fathers from other education levels.

Pearson correlation coefficient (*r*) was calculated to determine the relationship between students' science anxiety, science motivation and science achievement and the results are given in Table 10.

Table 10. *The Relationship Between Students' Science Anxiety, Motivation, and Academic Achievement*

	r	*p*
Science anxiety ↔ Science academic achievement	-.301	.000*
Science motivation ↔ Science academic achievement	.445	.000*
Science anxiety ↔ Science motivation	-.599	.000*

*p<.01, N = 629

According to Table 10, there was a moderate negative but significant relationship between science anxiety and science achievement (r= - .301, *p*< .01). However, there was a moderate positive but significant relationship between science motivation and science achievement (r= .445, *p*< .01). In addition, there was a moderate negative but significant relationship between science anxiety and science motivation (r= - .599, *p*< .01).

4. Conclusion and Discussion

In this study, science anxiety and motivation levels of secondary school students were compared in terms of some demographic variables (i.e., gender, class levels, and their parents' level of education) and the relationship between students' science anxiety, motivation and achievement was examined. Mean scores from the science anxiety scale was 30.26; the science anxiety level of students was very low. On the other hand, mean score from the science motivation scale was 125.82; the science motivation level of students was high. In addition, difference between the science anxiety and motivation scores according to gender, class levels, the parents' level of education were examined.

There was no significant difference between students' science anxiety in terms of gender. Looking at the literature, it was seen that there was no significant difference between female and male students' science anxiety in studies examining the effect of gender on science anxiety (Avci & Kirbaslar, 2017; Kahyaoglu, Birel & Yetisir, 2019; Udo, Ramsey & Mallow, 2004; Ulucinar-Sagir, 2012). Studies show that science anxiety varies based on gender, and female students are more anxious (Akgun, Gonen & Aydin, 2007; Anderson & Clawson, 1992; Mallow, 2006). However, these studies were conducted with students at different levels, not secondary school students, or students' exam anxiety was examined. Current study was carried out with secondary school students, examining their science anxiety. The science motivation of students was also examined in terms of gender variable. It was determined that there was a statistically significant difference between the science motivation of female and male students, and the science motivation of female students was higher than male students. Students with high motivation focus more easily on the subject and learn it sooner because they are more interested in the lesson. These students continue to struggle when they faced with difficulties, and they are determined to succeed (Pintrich & Schunk, 2002). In this context, the higher motivation of female students compared to male students might be effective in increasing their interest and active participation in the lesson. This situation can both increase their academic achievement in science and lead them to science-related professions in career planning. In the studies conducted by Chow & Yong (2013), Demir, Ozturk & Dokme (2012), Fortus & Vedder-Weiss (2014), Guvercin, Tekkaya & Sungur (2010), Inel-Ekici, Kaya & Mutlu

(2014), Sevinc, Ozmen & Yigit (2011), it was concluded that gender is an influential variable on science motivation and female students have higher science motivation. A possible explanation could be that female students carry the science course to their daily lives more and work more regularly than male students. Contrary to these results, studies conclude that gender is not effective on science motivation (Azizoglu & Cetin, 2009; Glynn, Taasoobshirazi & Brickman, 2009; Yenice, Saydam & Telli, 2012). A possible explanation could be the different study samples or measurement tools. In addition, when the findings of these studies were examined, it was found that the female students' motivations were higher than male students, although they weren't statistically significant.

The scores obtained from the science anxiety and motivation scale were also examined in terms of class levels, it was observed that there was no significant difference between the 5th, the 6th and the 7th grade students' anxiety levels, and there was a significant difference between the 8th grade and other class levels students' science anxiety levels. The science anxiety mean scores of the 8th grades were significantly higher than the other class levels. Similarly, while there was no significant difference between science motivation of the 5th, the 6th and the 7th grades, there was a significant difference between the 8th grades and other class levels. The 8th grades' science motivation mean scores were significantly lower compared to other grades. In other words, it can be said that 8th grades have higher science anxiety and less science motivation than other class levels. Science lesson is intertwined with daily life. This stimulates students' feelings of curiosity, research and discovery and increases their desire to true. However, 8th grade students work hard for a national examination called the High School Entrance Exam (HSEE). Preparing for this examination at an intense may have caused the 8th grades to suppress these feelings and experience anxiety. In addition to exam-oriented study, increasing difficulty levels of science subjects and encountering more abstract concepts can also be shown to increase anxiety and decrease motivation. While science subjects are taught in the 5th grade through activities or experiments, upper classes (especially in 8th grades) are taught with attention to testing and fundamental principles related to testing. This attitude of the teacher at different class levels may be another reason for the change in the anxiety and motivation levels of the students. Smart (2014) investigated the effect of teacher behaviours on the science motivation of secondary school students. Findings indicated that teachers' behaviours influence students' motivation to learn science. For instance, it was stated that teachers interact more with their students in younger age groups and use different methods and techniques to attract their attention. But they did not exhibit similar behaviours in older age groups, were more controlling, and the student-teacher interaction decreased (Smart, 2014). It was seen that as the class levels increased, students' science anxiety increased (Anderson & Clawson, 1992; Avci & Kirbaslar, 2017; Ulucinar-Sagir, 2012) and science motivation decreased (Atay, 2014; Fortus & Vedder-Weiss, 2014; Yenice, Saydam & Telli, 2012; Yildirim & Karatas, 2018). The teacher should create a supportive learning environment in the science teaching process and consider students' individual differences such as interests, skills, and learning strategies. Organizing the learning environment in this way might reduce students' anxiety and increase their motivation towards learning science.

There were significant differences between students' science anxiety in terms of parents' education levels. Significant differences were also determined in terms of science motivation. Science anxiety of students whose mothers and fathers are primary school graduates, and science motivation of students whose mothers and fathers have graduate/postgraduate degrees were found to be significantly higher. According to the results of the study, it can be said that the education levels of the mother and father is a variable that affects the students' science anxiety and motivation. This may be due to the fact that parents with higher education levels behave more consciously about the education of children and support them correctly in science learning. It is a well-known fact that the rearing style of parents greatly affects the child's emotional development. Parents' being too authoritarian or tolerant can be detrimental to the child's development. On the other hand, parents with a democratic attitude can direct their children according to their abilities. It has been observed that children of families with a democratic attitude are self-confident, able to cooperate more easily with others, and motivated by achievement (Senemoglu, 2005), and children of families with authoritarian attitude are more anxious (Akgun, Gonen & Aydin, 2007). In the literature, studies support the conclusion that parents' level of education has a significant effect on students' science anxiety and motivation (Atay, 2014; Inel-Ekici, Kaya & Mutlu, 2014). However, some studies disagree (Uzun & Keles, 2010; Yildirim & Karatas, 2018). In these studies, it was observed that students with parents from high education degrees had higher science motivation, but this result was not statistically significant.

There was a moderate negative but significant relationship between science anxiety and science academic achievement, and a moderate positive but significant relationship between science motivation and science academic achievement. In this context, science academic achievement will decrease as science anxiety increases, or scientific academic achievement will increase as science anxiety decreases. It can also be said that science academic achievement will increase as science motivation increases, or science academic achievement will decrease as science motivation decreases. In addition, there was a moderate negative but significant relationship between science anxiety and science motivation. The fact that students' science anxiety was low and science motivation was high, confirms this result. Students with high levels of anxiety can see various factors as a threat to themselves. This can lead to a decrease in their motivation and, consequently, academic achievement. In contrast, as students' science motivation increases, they will be expected to increase their science academic achievement as they become more willing to learn. In terms of achieving science learning goals, determining students' science anxiety and science motivations is critical. In this study, the results obtained on the relationship between science anxiety, science motivation, and academic achievement are in line with similar studies in the literature. For instance, in a study conducted by Avci & Kirbaslar (2017), a moderate, negative relationship was found between science anxiety and the academic achievement of secondary school students. In the meta-analysis study conducted by Alkan & Bayri (2017), a positive relationship was found between science motivation and science academic achievement. Similar results were obtained in the studies conducted by Tuan, Chin & Shieh (2005), Yildirim & Karatas (2018). Muezzin & Ozata (2019) found a moderate and negative relationship between secondary school students' science anxiety and science motivation.

There have been studies investigating the relationship between science anxiety and academic achievement or science motivation and academic achievement in the literature. A study was found that examined the relationship between science anxiety and science motivation (Muezzin & Ozata, 2019). In general, existing studies have investigated the relationship between anxiety, motivation, and academic achievement in mathematics education. In this context, in this study, the relationship between science anxiety, motivation and academic achievement in science education was investigated and it was determined that there was a relationship. In line with the results in the study, the following suggestions can be made:

- This study found that secondary school students' science anxiety levels were very low, and science motivation levels were high. However, when the scores obtained from the anxiety and motivation scales were analyzed one by one, it was seen that there were students with high science anxiety and low science motivation. In future research, interviews can be held with students with high science anxiety/low science motivation. With the study to be carried out qualitatively, the sources of this situation can be explored in depth.

- As a result of the research, it was determined that the 8th-grade students had higher science anxiety/low science motivation than other classes. A similar situation was found for students whose parents were primary school graduates. Variables such as class levels, parental education levels cannot be interfered with. However, positive feedback can be obtained by providing correct guidance. In this context, teachers and school administrators have important duties. The science teacher and the counsellor can cooperate and reduce the science anxiety and HSEE anxiety of the 8th-grade students and increase their science motivation. School administrators can give occasional informative seminars to families on how to behave and support their children. One-by-one interviews can be held with high anxiety students and their families.

- There was a significant relationship between science anxiety, motivation, and academic achievement. For improved academic achievement, it is important to organize the science learning environment so that anxiety can be reduced, and motivation can be increased. The science teacher should consider the characteristics of students and include teaching methods and techniques that will appeal to every student in their lessons.

- This study examined whether various variables make a significant difference in students' science anxiety and motivation. The relationship between these variables and science academic achievement and the extent to which they predict science academic achievement can be investigated.

- This research is limited to students in a public secondary school and the data collection tools used in the study. It is recommended to conduct similar studies with different data collection tools and different samples.

- In the science curriculum, the areas of knowledge and skillsdesired to be acquired by students are defined. However, affective characteristics such as anxiety and motivation are not directly included. It is a well-known fact that affective characteristics are highly influential in science learning. For this reason, affective characteristics should also be included in the science curriculum.

- In the changing and developing world, student needs and expectations are also changing. Science teachers must have the professional competence to meet these needs and expectations. In this context, the personal development of science teachers should be supported by professional training.

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Assessment of Item and Test parameters: Cosine Similarity Approach

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ARTICLE INFO	ABSTRACT
	The paper proposes new measures of difficulty and discriminating values of binary items and test consisting of such items and find their relationships including estimation of test error variance and thereby the test reliability, as per definition using cosine similarities. The measures use entire data. Difficulty value of test and item is defined as function of cosine of the angle between the observed score vector and the maximum possible score vector. Discriminating value of test and an item are taken as coefficient of variation (CV) of test score and item score respectively. Each ranges between 0 and 1 like difficulty value of test and an item. With increase in number of correct answer to an item, item difficulty curve increases and item discriminating curve decreases. The point of intersection of the two curves can be used for item deletion along with other criteria. Cronbach alpha was expressed and computed in terms of discriminating value of test and item. Relationship derived between test discriminating value and test reliability as per theoretical definition. Empirical verifications of proposed measures were undertaken. Future studies suggested.re to enter text.

1. Introduction

Tests consisting of binary items are traditionally scored as 1 for right answer and 0 for rest. Such scoring are frequently used for assessment in different educational levels. Item analysis aims at assessing the quality of the constituent items and test as a whole by revising or discarding ineffective items. Two popular measures are item difficulty value and item discriminating value. Difficulty value of an item is defined as the proportion of correct responses to the item. Higher difficulty value implies the item was easy and higher discriminating value implies that the item was more able to discriminate between students of higher and lower abilities. Item discriminating value refers to the ability of an item to distinguish between examines with high ability level from those with low ability level (Ferrando, 2012). Discriminating value of a binary item is traditionally computed as the upper-lower index using top 27% and bottom 27% of data and rejecting 46% of the data and hence may not be desirable. Moreover, relationship between item difficulty values ($Diff_i$), based on the entire data and item discriminating values ($Disc_i$) based on 54% of the data is not straight forward and have resulted in contrasting results. For example, Rao, et al. (2016) found positive correlation (0.563) between $Diff_i$ and $Disc_i$. Sim and Rasiah (2006) found that $Diff_i$ and $Disc_i$ are correlated positively at the "easy end" (where percentage difficulty values ranged between 80% and 100%), but negatively at the "difficult end" (where percentage difficulty values were between 0% and 20%) and dome-shaped curve when all items are considered. The authors suggested for evaluation of effectiveness of MCQ items. Chauhan, et al. (2013) proposed further study to investigate correlation between difficult index and discriminative index. Researchers differed marginally on the cutting points of classification of items under "poor discrimination power", "excellent discrimination", "good discrimination", etc. Lack of relationship between $Diff_i$ and $Disc_i$ and their relationships with test

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parameters could not reflect impact of deletion of one or more items on test reliability (r_{tt}) or error variance ($S_E{}^2$) or discriminating value of the test ($Disc_T$) or difficulty value of the test ($Diff_T$).

Reliability coefficient does not serve the purpose of quantifying the degree of discrimination offered by an instrument (Hankins, 2007). Inclusion of an item with negative or zero discrimination may result in measurement disturbance regarding the test. Thus, discriminating value is directly related to the quality of the score as a measure of the trait (McDonald, 1999). Item discriminating values are usually lower for non-homogeneous tests. Range of the discrimination index is between - 1.0 to 1.0. (Shakil, 2008; Denga, 2009).

Moreover, to assess quality of test as a whole, it is needed to consider test parameters like difficulty value and discriminating value of the test and find their relationships with other parameters like test reliability, validity. Discriminating value of a test is a test characteristic which is different from reliability and validity. One of the major objectives of a test is to find how the test can discriminate good performers from others or to see the extent to which an item or the entire test can discriminate the sample. The objective can be achieved if we find discriminating value of an item and discriminating value of a test.

Approaches without ignoring significant percentage of data include item-total correlation, bi-serial correlation (r_{bs}) , point bi-serial correlation (r_{pbs}), Spearman's correlation, etc. between item score and test scores (with or without that item) (Tzuriel and Samuels, 2000). While r_{bs} describes the relationship between an item score and scores on the total test for all examinees (Ebel and Frisbie, 1991), r_{pbs} reflects the predictive validity of the test (Henrysson, 1971). Moreover, r_{bs} tends to favor items of average difficulty. Researchers tend to differ on cutting point value of item-total correlation, below which items may be deleted. For example, Kehoe (1995) suggested restructuring of the items which have item-total correlation less than 0.15 since such items do not measure the same ability as does the test. But, Popham (2008) suggested rejecting the items for which $r_{pbs} \leq 0.19$

Need is to have reliable method of computing difficulty value and discriminating value of a test and items and find their relationships with test reliability under classical test theory (CTT). The complex model of Item Response Theory (IRT) was not considered primarily for its requirement of large sample size and strict assumptions including a curvilinear relationship between item score and construct score against a simple linear relationship between them by CTT.

The paper gives methods of obtaining difficulty and discriminating value of items and also tests using angular similarities and their relationships including estimation of test error variance and thereby the test reliability, as per definition (ratio of true score variance and observed score variance), via a single administration without sacrificing any portion of data and making no assumption of continuous nature or linearity or normality for the observed variables or the underlying variable being measured. Thus, the approach is an improvement over observation made by Rudner and Schafes, (2002) who mentioned that it is impossible to calculate a reliability co-efficiency that conforms to the theoretical definition since true scores of individuals taking the test are not known.

Rest of the paper is organized as follows. In the following Section, the proposed methodology of obtaining difficulty, discriminating values of binary items and test consisting of such items under CTT is elaborated along with derivation of relationship between difficulty values and discriminating values of an item and other parameters like item reliability and test reliability. Details of the empirical verification for the proposed methods are discussed in Section 3. The paper is rounded up in Section 4 by recalling the salient outcomes of the work.

2. Method

Consider a test consisting of *m*-binary items (1 for correct answer and 0 otherwise) has been administered to *n*-respondents, where $n > m$. Let $\mathbf{X} = (X_1, X_2, \ldots, X_n)^T$ be the test score vector, where X_i denotes test score of the *i*-th subject. Arranging the components of the vector $\boldsymbol{X}$ in decreasing order will give ranks of the individuals who took the test.

Consider the maximum possible test score vector $\mathbf{I}$ of order $n \times 1$ where $I_i = m \; \forall i = 1, 2, \ldots \ldots m$. Difficulty and discriminating value of items and test can be obtained using cosine of the angle between the vectors $\mathbf{X}$ and $\mathbf{I}$ involving inner-product of the two vectors and length of the vectors.

By definition, if angle between two vectors **X** and **Y** is θ, then $Cos\theta = \frac{X.Y}{\|X\|\|Y\|}$ where$\|X\|$ denotes length of the vector **X** and is defined as $\|X\| = \sqrt{\sum_{i=1}^{n} X_i^2}$. $\|Y\|$ is defined accordingly. This gives the novel area of angular statistics where $Cos\theta$ gives similarity between two vectors of same dimension. Note that, for acute angle θ, $0 \le Cos\theta \le 1$; $Cos\theta = 0$ if and only if **X** and **Y**are orthogonal; $Cos\theta_{XY} = 1 \Leftrightarrow$**X** = **Y**. However, the triangle inequality is not satisfied i.e. $Cos\theta_{XY} + Cos\theta_{YZ} \ge Cos\theta_{XZ}$ is not always true for **X≠Y≠Z**

2.1 Difficulty value of test:

Let $\emptyset$ be the angle between the vectors **X** and **I.** Here, $\|I\| = m\sqrt{n}$.

So,$Cos\emptyset = \frac{m\sum X_i}{\|X\|m\sqrt{n}} \Longrightarrow \bar{X} = \frac{\|X\|Cos\emptyset}{\sqrt{n}}$ (1.1)

Thus, test mean is equal to product of length of the score vector and cosine of the angle between the score vector and the maximum possible test score vector divided by square root of sample size.

From (1.1), $\bar{X}^2 = \frac{\|X\|^2 cos^2\emptyset_X}{n}$

Now $Sin^2\emptyset = 1 - \frac{n\bar{X}^2}{\|X\|^2} \Longrightarrow \|X\|^2 Sin^2\emptyset = \|X\|^2 - n\bar{X}^2$

$\Longrightarrow$ Test variance $S_X^2 = \frac{\|X\|^2 Sin^2\emptyset}{n}$ (1.2)

Thus, SD of test score is product of the length of the test score vector and sine of the angle between the test score vector and the maximum possible test score vector divided by the sample size.

If **X** coincides with **I**, then the test is extremely easy since each subject has got maximum possible score. Difficulty value of a test should consider two fold criteria viz. $\emptyset$ and ratio of $\|X\|$and $\|I\|$. Accordingly, difficulty value of a test ($Diff_T$) may be expressed as :

$Diff_T = \frac{\|X\|}{\|I\|} \cos \emptyset = \frac{\bar{X}}{m}$ (1.3)

Note that $0 \le Diff_T \le 1$ and higher the value of $Diff_T$, easier is the test.

(1.3) defines difficulty value of a test as a ratio of length of the observed score vector and length of the idle vector, multiplied by cosine of the angle between the two vectors, keeping harmony with the usual notion of difficulty value of a test which actually measures degree of easiness of a test.

2.2 Difficulty value of item:

Difficulty value of an item can also be found in line with (1.3). Here, components of n- dimensional item score vector are zeros and ones. Let I_i be the maximum possible score vector for an item where each component is equal to 1. If k – persons ($k \le n$) answer the i-th item correctly, then $\|X_i\| = \sqrt{k}$, $\|I_i\| = \sqrt{n}$ and $\cos \emptyset_i = \sqrt{\frac{k}{n}}$.

Thus, difficulty value of the i-th item ($Diff_i$) can be expressed as $Diff_i = Cos^2 \emptyset_i = \frac{k}{n}$ (1.4)

Clearly, $0 \le Diff_i \le 1$

It may be observed that difficulty value of an item as per (1.4) coincides with normal idea of proportion of persons passing an item and can be taken as empirical probability of passing an item. $Diff_i$increases monotonically with increase in k. The curve of $Diff_i$ is a positively slopped.

The approach also helps to find difficulty value of a test in terms of item difficulty values.

Now $\bar{X} = \frac{\sum_{i=1}^{m} k_i}{n} = \sum_{i=1}^{m} Diff_i$

Thus, from (1.3), $Diff_T = \frac{\sum_{i=1}^{m} Diff_i}{m}$ (1.5)

(1.5) expresses difficulty value of the test in terms of item difficulty values.

2.3 Discriminating value of test:

If the vector **X** makes a zero degree angle with the vector **I**, then the test fails to discriminate the subjects. So $\emptyset$ or some function of $\emptyset$ will reflect the discriminating value of a test. Since it is desirable for the discriminating value to lie in [0, 1], $tan\,\emptyset$ will measure the discriminating value of a test. Thus,

$$Disc_T = tan\emptyset = \frac{S_X}{\overline{X}} \text{ [From (1.1) and (1.2)]} \tag{1.6}$$

where $Disc_T$ denotes the discriminating value of a test.

Thus, discriminating value of a test is the ratio of SD and mean of the test score i.e. Coefficient of variation (CV) of the test scores.

2.4 Discriminating value of item:

Discriminating value of an item can be similarly defined by $Disc_i = \frac{S_{X_i}}{\overline{X}_i}$ $\tag{1.7}$

where $Disc_i$ the discriminating is value of the i-th item; $\overline{X}_i$ is the mean score of the i-th item and S_{X_i} is the SD of the i-th item.

For the i–th item, the components of vector **X**$_i$ are k- numbers of one's and rest zeros, if

$k < n$ persons could answer the item correctly. Thus, score of the i–th item can be taken as a Binomial variate with parameters n and p where p is the probability of correct answer and is equal to $Diff_i = \frac{k}{n}$. Mean and SD are np and $\sqrt{npq}$ respectively, where $q = 1 - p = \frac{n-k}{n}$

Thus, co-efficient of variation of the i-th item (CV_i) is $\frac{\sqrt{npq}}{np} = \sqrt{\frac{q}{np}} = \sqrt{\frac{q}{k}} = \sqrt{\frac{n-k}{nk}}$

Thus, $Disc_i = \frac{S_{X_i}}{\overline{X}_i} = \sqrt{\frac{n-k}{nk}}$ $\tag{1.8}$

Clearly, $Disc_i \geq 0$

The equation (1.8) avoids usual range of item discrimination values between - 1.0 to 1.0.

$Disc_i$ decreases with increase in k. Thus, $Disc_i$ curve is negatively sloped.

The $Disc_i$ may be multiplied by 100 and call it Percentage discriminating value of the item. Thus, Percentage discriminating value of the i-th item = $100.Disc_i$ $\tag{1.9}$

2.5 Relationship between $Disc_i$ and $Diff_i$:

From (1.8), $Disc_i{}^2 = \frac{n-k}{nk}$.

Putting $k = n.Diff_i$ from (1.4), we get $Disc_i{}^2 = \frac{1-Diff_i}{n.Diff_i} = \frac{1-Diff_i}{k}$ $\tag{1.10}$

i.e. square of discriminating value of an item is equal to (1-difficulty value of the item) divided by number of correct response (k) to the item.

It may be noted that low number of correct response (k) to the item means lower item difficulty value which implies higher discriminating value of the item, as per equation (1.10). Thus, relationship between $Diff_i$ and $Disc_i$ will be negative.

Observations:

(i) The discriminating value of an item is equal to the ratio of SD and mean of the item score i.e. coefficient of variation of the item score (CV_i)

(ii) If k= 0 i.e. the item is so difficult and no subjects could pass the item, then Discriminating value is not defined for the item. Clearly, such items with zero mean or infinite $Disc_i$ to be rejected without further investigation.

(iii) If $k = n$ i.e. if all the subjects pass an item, then discriminatory value is zero for that item.

(iv) $Disc_i = 1$ implies $k = \frac{n}{n+1}$ which is a fraction. Thus, $0 \leq Disc_i < 1$, unlike the usual method using upper 27% and bottom 27% of data where discriminating index ranges between -1 to +1.

(v)   Non-zero $Disc_i$ is maximum for $k=1$ and minimum when $k=(n-1)$. Thus, $Disc_i$ decreases monotonically with increase in k. In other words, the Percentage $Disc_i$ curve is negatively slopped non-linear curve. Equation (1.8) suggests that the curve showing $100.Disc_i$ and k has the form of a rectangular hyperbola for a given value of n.

(vi)   Discriminating value of test and also item by CV has desired properties. Moreover, it is easy to estimate population CV as $\frac{\sigma}{\mu}$ where μ and σ are unbiased estimate of population mean and SD respectively.

(vii)   If i-th and j-th items ($i \neq j$) have same mean, the item with lower SD will have lower CV and lower $Disc_i$.

(viii)   To find value of k_0 for which $Disc_i = Diff_i$, one needs to solve the equation $\sqrt{\frac{n-k}{nk}} = \frac{k}{n}$ or

$$k^3 = n(n-k) \qquad\qquad (1.11)$$

In general, for a given value of n, value of k may be obtained through iterative solutions and choosing k appropriately between two successive integers between which k lies to satisfy (1.11) Alternately, k could be taken as the value (to the nearest integer) where the negatively slopped Percentage$Disc_i$ curve intersects with the positively slopped $Diff_i$ curve. Solution of (1.11) may be denoted as k_0.

Deletion of items:

Selection of items could be choosing the acceptance region as $(k_0 \pm \Delta)$ where $\Delta = 2SD$ of distribution of item difficulty values or item discriminating values. Choosing $\Delta = 3SD$ may result in discarding too few items and may not be desirable from the practical point of view.

In addition, considering skewness of distribution of $Diff_i$ (or $Disc_i$), few more items having high concentration at the tail may be discarded.

However, choice of Δ may depend on original number of items in the test, type of test, whether to measure single dimension or multi dimensions and also considering relationship between test discrimination and test reliability.

2.6 Relationship between difficulty values and discriminating value of a test

From (1.3) and (1.6) we get $Diff_T . Disc_T = \frac{S_X}{m}$ $\qquad\qquad (1.12)$

i.e. product of difficulty value and discriminating value of a test is equal to SD of the test divided by number of items in the test. Discarding of few easy items (with high values of k) and few extremely difficult items (with very low values of k) will reduce m, and in turn may increase $Diff_T . Disc_T$.

2.7 Item – total correlation:

Point-biserial correlation coefficient (r_{pbs}) is the proper statistic to reflect item-total correlation i.e. the degree of relationship between score of an item (dichotomous variable) and test score (interval/ratio scale). r_{pbs} for the i-th item is defined as

$$r_{pbs(i)} = \frac{(M_{pi} - M_{qi})\sqrt{p_i q_i}}{S_X} \qquad\qquad (1.13)$$

where $r_{pbs(i)}$: Point-biserial correlation coefficient for the i-th item

M_{pi}: Test mean for persons answering the i-th item correctly (i.e., those coded as 1s)

M_{qi}: Test mean for persons answering the i-th item incorrectly (i.e., those coded as 0s)

S_X: Standard deviation of the test scores

p_i: Proportion of persons answering correctly i-th item $= \frac{k_i}{n}$ where score of the i-th item is k_i

$q_i = 1 - p_i$

Note that

i) $M_{pi} + M_{qi} = \bar{X}$(Test mean). Thus, $M_{pi} - M_{qi} = 2M_{pi} - \bar{X} = \bar{X} - 2M_{qi}$

ii) $p_i = \frac{k}{n} = Diff_i$ by (1.4).

iii) $q_i = 1 - p_i = 1 - \frac{k}{n} = \frac{n-k}{n} = k.Disc_i^2$ by (1.7) and (1.8)

iv) $S_X = \bar{X}.Disc_T$ by (1.6)

Putting the above in (1.13) and considering that k-persons could answer the i-th item correctly, we get

$r_{pbs(i)} = \frac{(M_{pi}-M_{qi})\sqrt{\frac{k_i}{n}(\frac{n-k_i}{n})}}{\bar{X}.Disc_T}$ from (1.4) and (1.6)

$$= \frac{(M_{pi}-M_{qi})\sqrt{Diff_i(1-Diff_i)}}{\bar{X}Disc_T} \tag{1.14}$$

(1.14) depicts a negative relationship between item-total correlation, in terms of point biserial correlation and discriminating value of the test. High value of r_{pbi} indicates that persons who correctly answered the i-th item have done well overall on the test. Thus, r_{pbi} could be taken as measure item reliability. Clearly, $r_{pbi} \geq 0$ if $(M_{pi} \geq M_{qi})$

(1.14) can be further simplified as

$r_{pbs(i)} = \frac{(M_{pi}-M_{qi})\sqrt{Diff_i(\frac{Disc_i^2}{k_i})}}{m.Diff_T.Disc_T}$ from (1.10)

$= \frac{(M_{pi}-M_{qi})Disc_i\sqrt{Diff_i}}{k_i.m.Diff_T.Disc_T} = \frac{(M_{pi}-M_{qi})}{k_i.m}.\frac{Disc_i}{Disc_T}\frac{\sqrt{Diff_i}}{Diff_T}$

Now, $Disc_i.\sqrt{Diff_i} = \sqrt{\frac{(1-Diff_i)(Diff_i)}{k_i}} = \frac{\sqrt{n-k_i}}{n}$ and $Diff_T.Disc_T = \frac{S_X}{m}$

Thus, $r_{pbs(i)} = \frac{(M_{pi}-M_{qi})}{k_i.m}.\frac{\sqrt{n-k_i}}{n}.\frac{m}{S_X} = \frac{(M_{pi}-M_{qi})\sqrt{n-k_i}}{nk_iS_X}$ $\tag{1.15}$

(1.15) may be taken as computational formula for $r_{pbs(i)}$

While reliability is a measure of association or similarities of two vectors, discrimination is a measure of dissimilarities or distance between the vectors. Higher values of item reliability are desirable. If two items have equal item discriminating value, then the item with higher variance is preferred to be retained

2.8 Relationship between test reliability and discriminating value of a test:

Let k_i be the number of persons answering the i-th item correctly. Then, from (1.7), variance of the i-th item $S_{X_i}^2 = \bar{X}_t^2.Disc_i^2$. Thus, sum of item variances, $\sum_{i=1}^m S_{X_i}^2 = \sum_{i=1}^m \bar{X}_t^2.Disc_i^2$

From (1.6), test variance $S_X^2 = \bar{X}^2.Disc_T^2$. Thus, test reliability in terms of Cronbach alpha is $\alpha = (\frac{m}{m-1})(1 - \frac{\sum_{i=1}^m \bar{X}_t^2.Disc_i^2}{\bar{X}^2.Disc_T^2})$ $\tag{1.16}$

(1.16) expresses α in terms of terms of discriminating value of items and discriminating value of the test. For uni-dimensional test, impact of deletion of an item on alpha can be worked out finding changes in respective item and test parameters.

However, in general, considering theoretical definition of test reliability, $r_{tt} = \frac{S_T^2}{S_X^2}$, we get

$r_{tt}(Disc_T)^2 = \frac{S_T^2}{\bar{X}^2} = (\frac{S_T}{\bar{X}})^2 = (\frac{S_T}{\bar{T}})^2$ $\tag{1.17}$

Thus, product of test reliability and square of test discriminating value is equal to square of CV of true scores. However, verification of the relationship may require finding test reliability as per the definition

Chakrabartty, (2013) proposed a method of obtaining test reliability as per the theoretical definition along with computation of error variance and true score variance from single administration of the test. The method involves an algorithm for splitting the test in two parallel halves with almost equal mean and SD and using lengths of score

vector of each such sub-test and the angle between the two vectors representing scores of the two parallel sub-tests. Method of obtaining test reliability as per theoretical definition is briefly discussed here.

If a test administered among n-subjects is dichotomized in two parallel halves say g-th and h-th sub-tests, two points X_g and X_h are obtained in the n-dimensional space. As per classical definition, two tests "g" and "h" are parallel if $T_{gi} = T_{hi}$ and $S_{eg} = S_{eh}$, from which one can derive $\overline{X_g} = \overline{X_h}$ and $S_{Xg}^2 = S_{Xh}^2$.

Also, $X_g = T_g + E_g$ and $X_h = T_h + E_h$. Now $T_{gi} = T_{hi} \Rightarrow X_{gi} - X_{hi} = E_{gi} - E_{hi}$, so that

$$\|X_g\|^2 + \|X_h\|^2 - 2\|X_g\|\|X_h\|Cos\theta_{gh} = \|E_g\|^2 + \|E_h\|^2 - 2\|E_g\|\|E_h\|Cos\theta_{gh}^{(E)}$$

where θ_{gh} is the angle between X_g and X_h and $\theta_{gh}^{(E)}$ is the angle between E_g and E_h. But correlation between error scores of two parallel tests is zero. Thus,

$$\|X_g\|^2 + \|X_h\|^2 - 2\|X_g\|\|X_h\|Cos\theta_{gh} = \|E_g\|^2 + \|E_h\|^2 = NS_E^2$$

since $S_E^2 = \frac{1}{N}\Sigma(E_{gi} + E_{hi})^2 = \frac{1}{N}[\|E_g\|^2 + \|E_h\|^2]$

The above equation suggests

$$S_E^2 = \frac{1}{N}[\|X_g\|^2 + \|X_h\|^2 - 2\|X_g\|\|X_h\|Cos\theta_{gh}] \qquad (1.18)$$

Hence, $r_{tt} = 1 - \dfrac{\|X_g\|^2 + \|X_h\|^2 - 2\|X_g\|\|X_h\|cos\theta_{gh}}{NS_X^2} \qquad (1.19)$

Equation (1.19) gives theoretical test reliability in addition to estimate error variance of the test by (1.18) and hence true score variance.

Equation (1.19) and (1.18) may also help to find impact of deletion of items on error variance of the test and test reliability respectively. Items must not be deleted if test reliability gets reduced or error variance of the test gets increased.

2.9 Deletion of items:

Based on point of intersection of the $Diff_i$ and $Disc_i$ curves:

Let k_0 be the value for which $Diff_i = Disc_i$. Selection of items to increase discriminating value of the test could be choosing those items for which k lies in a neighborhood of k_0 like $(k_0 \pm \Delta)$ where Δ may be 2SD of distribution of k. Alternatively, considering values of item difficulty ($K_{0(Diff)}$) and/or item discriminating ($K_{0(Disc)}$) corresponding to k_0, the acceptance region could be $(K_{0(Diff)} \pm \Delta)$ or $(K_{0(Disc)} \pm \Delta)$ where Δ= 2SD of distribution of item difficulty values or item discriminating values. $(k_0 \pm 3SD)$ may result in discarding too few items and may not be desirable from the practical point of view.

However, choice of Δ may depend on original number of items in the test, type of test, whether to measure single dimension or multi dimensions and also considering relationship between test discrimination and test reliability.

Based on Item reliability:

Items with marginal point biserial correlation coefficient may be adjusted or removed.

Based on other criteria:

Considering skewness of distribution of $Diff_i$ (or $Disc_i$), few more items having high concentration at the tail may be discarded.

Deletion of items is advisable only when reliability of the test improves upon deletion.

3. Empirical verification:

Data: A Selection Test was administered to 911 candidates. The test had 50 items and maximum time given was 90 minutes. Scores of those 911 candidates were considered for empirical verification of the foregoing method. Here, n= 911 and m = 50

For the test, Mean = 20.49506; Median = 10; Mode = 11 and Variance = 11.95799. Thus, the distribution of test score was not symmetric.

By (1.3), $Diff_T = \frac{\|X\|}{\|I\|}\cos\emptyset = \frac{\bar{X}}{m} = 0.409901 \Rightarrow$ Test was moderately difficult

By (1.6) $Disc_T = tan\emptyset = \frac{S_X}{\bar{X}} = 0.168725 \Rightarrow$ Test had rather poor discriminating value.

Item discriminating value as defined in (1.8) exceeded 0.1 only for one item (Item no.40 with k= 30. For meaningful comparative statements of item discriminating values and item difficulty values, each $Disc_i$ was multiplied by 100

Frequency distribution of Item difficulty values and Percentage Item discriminating values are shown in Table – 1

Table – 1. *Frequency distribution of $Diff_i$ and Percentage $Disc_i$*

Item difficulty values ($Diff_i$)		(Percentage $Disc_i$)
Intervals	Frequency	Frequency
Up to 0.1	1	16
0.1 – 0.2	4	12
0.2 – 0.3	13	8
0.3 – 0.4	7	6
0.4 – 0.5	8	4
0.5 – 0.6	7	2
0.6 – 0.7	6	--
0.7 – 0.8	4	1
0.8 – 0.9	--	--
0.9 and above	--	1
Total	50	50

Graphs showing difficulty values and discriminating values of items are given in Figure 1.
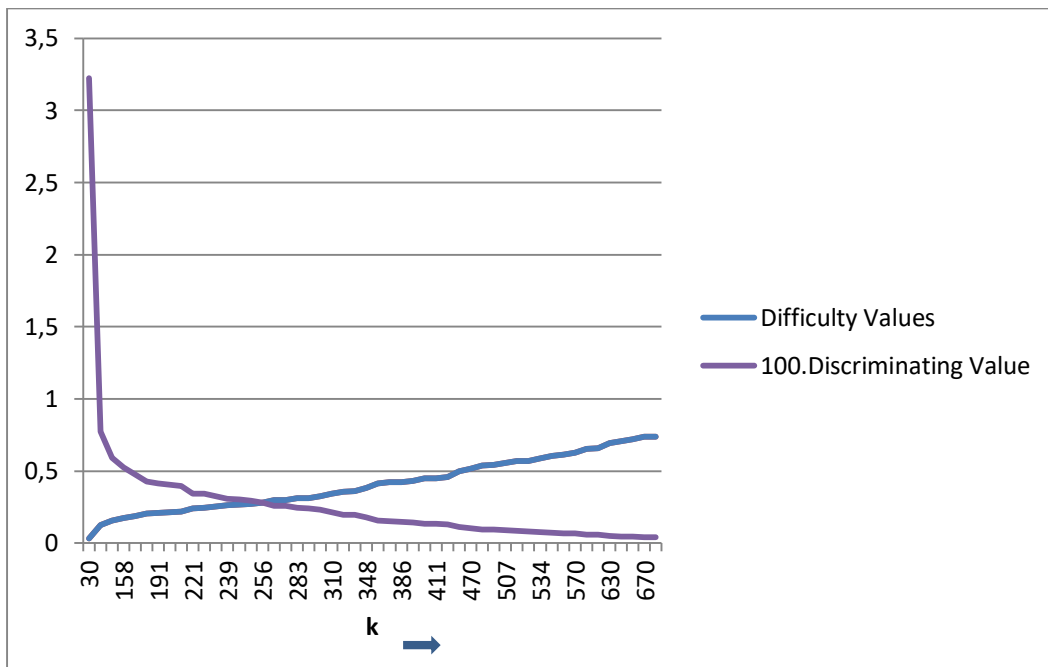
Figure. 1: Item Difficulty Values and Percentage Discriminating Values of İtems

Clearly, as k increases, item difficulty curve increases and percentage item discriminating curve decreases. The two curves cut at a point (k_0)= 368. Note that at k=368, item difficulty is 0.40395 and percentage item discriminating is 0.40245, the difference being 0.00149. Shifting k_0 to the right will increase proportion of items with high difficulty values (and low discriminating values). Thus, choice of k_0 may be considered while

deleting number of items from the test. In the instant case, the test had 25 items (i.e. 50% of items) in the left of k_0

The items to be ignored may be those lying outside ($k_0 \pm 2SD$ of Item scores). Mean and SD of item scores, ($Diff_i$) and ($Disc_i$) along with acceptance regions are given in Table -2.

Table – 2. *Acceptance Region of Items*

	Mean	SD	Acceptance region ($k_0 \pm 2SD$)
Item score	20.49	167.5	368±335.18
$Diff_i$	0.02249	0.1839	0.02249 ±0.3679
$Disc_i$	0.00258	0.025	0.00258 ±0.05089

Each of the above method resulted in discarding the item no. 40 only with k=30, being extremely difficult i.e. lowest Diff. value (0.033) and highest Disc. value (0.17954).

Deletion of an item will change values of $Diff_T$ and $Disc_T$. For example, if the most difficult item with k=30 is deleted, new $Diff_T$ increased to 0.4175945 from original value of 0.409901 and new $Disc_T$ got reduced to 0.1739181 from original value of 0.168725.

The present data had 16 items with k-values less than 368 (k_0) and 34 items with k-values exceeding k_0 (rather easy items). Easy items with high k-values (i.e. high Diff. values say ≥ 0.70 implyinglow Disc. values≤ 0.022) may also be considered for discarding. Adoption of this criteria implies discarding of additional four items (viz. Item no. 1(k= 670*); 8 (k= 654); 33 (k= 645*) and 44(k= 672).

Correlation between difficulty values and discriminating values of items:

The graph of item difficulty values and item discriminating values suggest that the $r_{Diff_i Disc_i}$ be negative. Value of $r_{Diff_i Disc_i}$ was (-) 0.579586.

Test reliability:

The 50 items of the test were dichotomized to g-th and h-th subtests following the procedure given by Chakrabartty (2013). Resultant parallel halves as per the proposed iterative method are given in Table-3

Table–3. *Splitting as per the iterative process*

g-th sub-test		h-th sub-test		Difference (g-h)
Item No.	Item Score	Item No.	Item Score	
41	113	40	30	83
5	158	16	143	15
7	171	43	187	-16
20	194	28	191	3
47	197	30	221	-24
49	230	15	222	8
19	239	17	243	-4
11	256	26	248	8
21	273	27	273	0
2	283	18	285	-2
10	294	32	310	-16
50	328	6	325	3
23	348	42	375	-27
29	386	48	385	1
13	393	22	410	-17
14	417	3	411	6
38	452	34	470	-18
39	491	12	493	-2
36	507	4	519	-12
24	534	25	520	14
46	551	45	558	-7
35	595	9	570	25

37	601	31	630	-29
8	654	33	645	9
1	670	44	672	-2
Sum	9335		9336	-1
Mean	10.25		10.25	0
SD	66.70		67.11	-0.41

Observations:

- Splitting the test by the iterative process resulted in $\overline{X_g} = \overline{X_h} = 10.25$ and $|S_g - S_h| = 0.418$.

Marginal difference (0.418) between the SDs of the g-th and h-th tests (much less than the same obtained from odd–even split half). Accordingly, splitting half as per the iterative process was considered better for almost equality of means and SDs.

- Split-half reliability r_{gh} as the correlation between person scores in the g-th and h-th subtests was found to be 0.380813

Here, $\|X_g\| = 315.6169$; $\|X_h\| = 315.6058$ and $Cos\theta_{gh} = 0.975479$

Theoretical reliability of the test $r_{tt} = 1 - \frac{\|X_g\|^2 + \|X_h\|^2 - 2\|X_g\|\|X_h\|cos\theta_{gh}}{n.S_X^2} = 0.551577$ and

$S_E^2 = \frac{1}{n}[\|X_g\|^2 + \|X_h\|^2 - 2\|X_g\|\|X_h\|Cos\theta_{gh}] = 5.362239$

and true score variance = 6.595749

Theoretical reliability of the test was higher than the Split-half reliability but lower than Cronbach $\alpha(0.78)$

4. Findings and Conclusions

New measures of difficulty and discriminating values of binary items and test consisting of such items were proposed considering cosine similarity i.e. length of two score vectors and angle between them. The measures considered entire data and not only top 27% and bottom 27% of data. Difficulty value of a test ($Diff_T$) is defined as the ratio of length of the observed score vector and length of the idle vector, multiplied by $\cos\emptyset$ where $\emptyset$ is the angle between the two vectors, keeping harmony with the usual notion of difficulty value of a test which actually measures degree of easiness of a test. Discriminating value of a test ($Disc_T$) is $\tan\emptyset$ which is the ratio of SD and mean of the test score. Similarly, discriminating value of an item ($Disc_i$) is equal to the ratio of SD and mean of the item score i.e. coefficient of variation (CV). Here, $0 \leq Disc_T \leq 1$ and similar inequalities hold for $Disc_T, Diff_T$ and $Diff_i$. Discriminating value of test and also item in terms of CV has desired properties. Moreover, it is easy to estimate population CV.

Relationship derived between item difficulty value and item discriminating values. As number of correct answer to an item (k) increases, item difficulty curve increases and item discriminating curve decreases. The point of intersection of the two curves (k_0) is a data driven criterion which may be considered in deciding the items to be deleted which are lying outside acceptance region defined as an interval ($k_0 \pm \Delta$) where Δ could be taken as 2SD of distribution of Item scores or $Diff_i$ or $Disc_i$. Other criteria of item deletion could be based on skewness of distribution of item scores or item reliability i.e. point biserial correlation coefficient of an item. However, actual deletion of items needs to consider impact of such deletions on reliability of the test.

Relationship established between difficulty value and discriminating value of a test. Cronbach alpha was expressed and computed using sum of item difficulty values and test discriminating value. Similarly, relationship derived between test discriminating value and test reliability as per theoretical definition. Further, relationship derived between item reliability to depict Item-total correlations, in terms of Point biserial correlation ($r_{pbs(i)}$) with test parameters like $Disc_T, Diff_T$ and also item parameters like $Diff_i$ and $Disc_i$. In fact, $r_{pbs(i)}$ has a negative relationship with test discriminating value and number of items in the test.

Test reliability as per theoretical definition was computed. Empirically, value of theoretically defined reliability was greater than the split-half correlation but marginally lower than Cronbach alpha. Future investigations may be undertaken to verify the proposed measures and their factors with multiple data sets.

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Study Habits, Self-Esteem, and Academic Achievement Among Public and Private Secondary School Students in Bangladesh

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ABSTRACT

Studies on academic achievement worldwide are sporadic, focusing on variables more or less have been taken by the researchers, and provided knowledge. This cross-sectional study aimed to determine how the school effect influences secondary school students' academic achievements by two important significant (study habits and self-esteem). With a covenient sampling method, 400 students from eight secondary schools in Bangladesh were selected for the study. Though the students were equally divided regarding gender (Boys, 200; Girls, 200), they were different regarding school types (Public, 188; Private, 212). Their ages range from 14 to 17, with an average of 14.8. They provided responses on two Bangla version scales: Study Habit Scale and Self-Esteem Scale. Academic achievement was significantly positively correlated with both study habits (r=.268, p<.01) and self-esteem (r=.291, p<.01). Two predictors of the study were also correlated with each other (r=.283, p<.01). Public and private school students were not varied significantly in studying habits and academic achievement, but they were significantly different in self-esteem. The study habits and self-esteem jointly explained 12.3% for public school students' academic achievement whileit explained 7.5% variance for the private school students. The discussion implies that how students' study habits and self-esteem facilitate their academic achievement. Further studies will reflect more factors influencing academic achievement.

Keywords:
Academic achievement, public vs. private, secondary schools, self-esteem, study habits

1. Introduction

Study habits generally refer to pupils' repeated actions to study from the beginning to the end of all educational programs. It refers to students' habitual practices to complete their curriculum (i.e., the totality of experiences in the educational process). It typically denotes the degree to which the student engages in regular acts of studying characterised by appropriate studying routines (e.g., reviews of material) occurring in an environment conducive to studying (Crede & Kuncel, 2008). Study habits are students' way of studying, whether systematic, efficient, or inefficient (Good, 1998); the adopted way and manner a student plans to attain mastery of the subject (Azikiwe, 1998). Study habits are a multidimensional concept that involves setting up strategies, scheduling a study plan and time, definite place, and behaviour patterns by a student to form a structured approach to self-learning and doing accordingly in his or her academic life. It is influenced not only academic adjustment but also the personal and social adjustment for the students beyond school years.

As an influential predictor of specific outcomes such as academic achievement, self-esteem is attractive as a social psychological construct (Marsh, 1990, Aryana, 2010). It affects how we are and act in the world and the way we are related to everybody else (Jordan, Spencer, & Zanna, 2003; Bonet, 1997). Self-esteem may be one

of the essential self-evaluation dimensions because it is the overall value one feels about oneself (Bono & Judge, 2003; Chang et al., 2012; Judge, Locke, Durham, & Kluger, 1998). It is an overall and global emotional placement of self (Frost & McKelvie, 2005; Robins, Tracy, Trzesniewski, Potter, & Gosling, 2001), positive or negative evaluation of the self (Rosenberg, 1965; Smith & Mackie, 2007). It can be either positive, leading to greater happiness or potentially leading to depression (Baumeister, Campbell, Krueger, & Vohs, 2003).

Academic achievement represents performance outcomes that indicate the extent to which a person has accomplished specific goals that were the focus of activities in instructional environments, specifically in school, college, and university (Steinmayr, Meibner, Weidinger, & Wirthwein, 2014). It is the knowledge attained or skills developed in school (Good, 1993). It is the extent to which a student, teacher or institution has achieved their educational goals. The field of academic achievement covers a wide variety of educational outcomes that depends on the indicators used to measure it. According to Steinmayr er al. (2014), there are very general indicators of academic achievement such as procedural and declarative knowledge acquired in an educational system, more curricular-based criteria such as grades or performance on an educational achievement test, and cumulative indicators of academic achievement such as educational degrees and certificates. In almost all societies, either developed, or developmental, academic achievement plays a vital role in every person's life. In Bangladesh, academic achievement for all educational systems is going through a general measure, that is, grades or performance (e.g. GPA) performed on several test or examinations. Therefore, academic achievement defines how one can take part and succeed in every education system.

For the last twenty years, tremendous educational development has proliferated globally and in Bangladesh, especially for private secondary schools. Privately organized schools are now more popular than any other time in Bangladesh education history. In 1995, the total number of secondary schools was 12012, but private schools increased 39% per cent in 2018 and reached upto 20465, accounting for a 98% increase for private schools over public ones (BANBEIS, 2018). Not only in Bangladesh is the above scenario almost common amongst all developing countries as well. Public versus private school education is a compelling topic in international dialogue as well as national now. Some people argue that public school students have better educational achievement than private schools, while others favour private schools over public. So there is a challenge to know the school effects in the measure of academic achievement at the secondary school system. The study will lead to a great extent to measure the school effects on academic achievement with the present data results.

1.1. Theoretical background

The theoretical framework provides the fundamental basis for the study is considered. From the educational relevance, the gestalt theory of learning implies understanding the academic performance, the environment which stimulates certain study habits, use of instructional materials, and perception and understanding of a lesson by the student. From motivational perspective (Maslow, 1943), a student's physiological needs must be satisfied first for good study habit formation. Then, he/she will move to their teaching instructions with a sense of belonging, and are eventually motivated to develop appropriate study habits and have improved academic performance. Maslow (1987) described esteem needs that are more relevant to the study, including how confident a student feels his/her sense of achievement and worth.The idea is that once a student builds a healthy level of self-esteem, he/she can move on to achieving and self-improvement.

1.2. Literature reviews

Study habit measures improve academic performance predictions (Awang & Sinnadurai, 2011; Crede & Kuncel, 2008). Good study habits produce positive academic performance, while inefficient study habits lead to academic failure (Azikiwe, 1998; Good, 1998; Mendezabal, 2013; Onwuegbuzies, Slate, & Schwatz, 2001). There is a positive relationship between study habits and academic achievement for secondary students (Hussain, 2006; Kurshid, Tanveer, & Naz Qasmi, 2012; Osa-Edoh, & Alutu, 2012). Findings revealed a highly significant relation among various study habits and academic performance (Bashir & Mattoo, 2012; Fazal, Hussain, Majoka, & Masood, 2012; Nuthana & Yenagi, 2009). A significant positive relationship found between achievement and proper study schedule for secondary students (Riaz, Kiran & Malik, 2002). Female secondary students possess more effective study habits and higher academic achievement than their male counterparts

(Fayombo, 2010; Kurshid et al., 2012). A positive relationship found between overall self-esteem and the students' study habits of the secondary school students (Estrella, 2015; Nyamu, 2007).

Self-esteem is the influential predictor of academic achievement (Marsh, 1990). There is a significant positive correlation between academic achievement and self-esteem, meaning that students with high academic achievement tend to feel more confident than low achiever counterpart (Baumeister, 2005, 2009; Marsh, Byrne, & Young, 1999; Ross & Broh, 2000). For both US and UK school samples, Booth & Gerard (2011) demonstrated that self-esteem is related to multiple academic achievement indicators. Grade differences in between self-esteem and academic achievement found for the study of 838 secondary students in the US (Alves-Martins et al., 2002). There is myriad research in gender differences in self-esteem, in which female high school students obtained higher grades and outperformed males in self-esteem (Jacobs, 2002; Lao, 1980; Wilberg & Lynn, 1999). On the contrary, male students' self-esteem is generally moderately higher than females (Heaven & Ciarrochi, 2008; Hergovich, Sirsch & Felinger, 2004; Kling, Hyde, Showers, & Buswell, 1999; Quatman & Watson, 2001; Young & Fisler, 2000).

School types (private or public high school) make a difference in student academic performances (Hahn et al., 2014; Philias & Wanjohi, 2011). Most studies examining the private and public sectors focused solely on academic outcomes with varying results. There is a difference between public and private schools regarding study habits influential for public schools. Public schools perform favourably with private schools (Braun et al., 2006). Likely public schools, students in private schools have better academic performance than those in public schools (Hahn et al., 2014; Peterson & Elena, 2006). Private secondary schools have no direct effect on public secondary school achievement (Alimi et al., 2012; Sander, 1999). Public and private high school participants significantly differed on self-esteem, with private school participants reporting high levels of self-esteem and public school participants reporting moderate self-esteem levels (Adediwura et al., 2008; Mergler & Spooner-Lane, 2008). Most studies show that, on average, girls do better in school than boys. Girls get higher grades and complete high school at a higher rate than boys (Jacobs, 2002).

In terms of three factors, few types of research have been conducted in Bangladesh yet. However, in particular, there are numerous studies in academic achievement measuring with certain socio-demographic variables more or less taken by the researchers. Academic achievement had been measured to some extent, for example, an achievement with parental acceptance (Akter et al., 2013); achievement regarding different demographic factors (e.g. age, gender, medium of education; Alam et al., 2014); achievement in community factors (Alam, 2015), etc. Also, there is some research considering self-esteem with demographic variables (Uzzaman et al., 2013), self-esteem with optimism (Ahmed, 2012), and self-esteem with social responsibility (Akhter & Hossain, 2012). Researchers were more interested in 'self-concept' than 'self esteem' with academic achievement in our country. They found a positive correlation between dimensions of self-concept with school student's academic achievement (*Shahrier & Enam, 2012; Talukder & Parvin, 2011) or* found a negative one, self-concept was not a predictor of academic achievement of secondary school students (Sagar, 2014). Though some studies were conducted considering public vs private university students (Akhter & Hossain, 2012), it is scarce in the secondary school context in Bangladesh.

1.3. Problem statement

The public versus private school issue is a common debate over the world now. Researchers in Bangladesh are now showing considerable interest to conduct a new study on the private vs. public school issues. Effective study habit is essential for any student's success in school. Students who have developed good study habits are more likely to experience increased competence and confidence as they learn. Thus, good study habits make a student have good self-esteem. The combination of good study habits and positive self-esteem facilitates excellent academic performance while their absence may adversely affect academic achievement (Palaniappan, 2007). So, it is crucial to look for a more justified study habits that can enhance self-esteem and academic performance. Our concern is to conduct a study to investigate the relationship among study habits, self-esteem and academic achievement of public and private secondary school students. The research framework for the present study is given in the following figure 1.
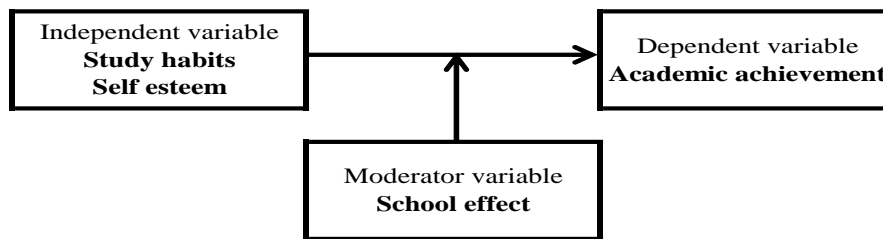
Figure 1. *Research Framework of The Present Study*

1.4. Purpose

This study's primary purpose was to determine whether study habits and self-esteem affect academic achievement adopted by public and private secondary school students.

1.5. Research questions

Based on the previous research discussed in the literature review, the following research questions were formulated for the present study:

H1: Is there a difference between private and public-school students regarding study habits, self esteem, and academic achievement?

H2: Are there relative influences of study habits and self-esteem on academic achievement?

H3: Is there a relationship among students' study habits, self esteem, and academic achievement?

H4: Is there a relationship among subscales of study habits and students' academic achievement?

H5: Is there a difference between boys and girls in terms of study habits, self-esteem, and academic achievement?

2. Methods

2.1. Population and sample

The target population of the study was secondary school students (both public and private) in Bangladesh. There is a total of 10330695 secondary school students in Bangladesh (Bangladesh Bureau of Statistics, 2019). Before starting data collection from the target population, we used the Raosoft Sample Size Calculator (Rao, 2012) to measure the study's actual sample size. Based on the four criteria: a) total target population; b) 5% of marginal error acceptation; c) 95% of the confidence interval; and d) 50% of response distribution; this calculator recommended 385 participants as the sample size for the present research. Thus, a decision was made to select at least 400 students from secondary schools in Bangladesh. Consequently, questionnaires were provided to 480 students at 8 secondary schools (60 in each school). Convenient sampling was used to pick up students from each selected school. Finally, the sample size of the study included 400 students with an acceptance rate of 83.33%. The study students were from eighth to tenth grade, ranging between 14 to 17 years (M=14.8, SD=.76).

Table 1. *Distribution of Students in Terms of Gender and School Types (N=400)*

School no	School type	Number and percentage of students	Gender-wise distribution		School-wise distribution	
			Boys	Girls	Public	Private
1	Public (boys)	45 (11.25)	45	0	45	0
2	Private (co-education)	58 (14.50)	29	29	0	58
3	Private (girls)	51 (12.75)	0	51	0	51
4	Public (co-education)	42 (10.50)	21	21	42	0
5	Private (boys)	53 (13.25)	53	0	0	53
6	Private (co-education)	50 (12.50)	25	25	0	50
7	Public (girls)	47 (11.75)	0	47	47	0
8	Public (co-education)	54 (13.50)	27	27	54	0
	Total	400 (100)	200	200	188	212

2.2. Reserach design

A cross-sectional research design was used in the study. In this design, a researcher measures the outcomes and exposures in the study participants simultaneously. By considering this design, the researcher decided that he would compare different sample groups (public and private students) at a single point of time using survey questionnaires.

2.3. Measuring instruments

The following measurement scales measured students' self-esteem, study habits, and academic achievement.

2.3.1 Self esteem scale

The Bangla version of the self-esteem scale (Ilyas, 2002), initially developed by Rosenberg (1965), was used to measure self-esteem. The original sample for which the scale was developed consisted of 5024 high school juniors and seniors in New York. The scale is a 10-item measure of positive and negative aspects of self-esteem. The responses were scored on a 4-point Likert scales ranging from strongly agree (3) to strongly disagree (0). There were reversed scores for items 3, 5, 8, 9, 10. The possible range of score is 0-30. The sum of the scores was classified according to self-esteem level, with 15–25 considered normal and scores <15 considered low self-esteem. High Cronbach alpha (α=.87) for the Bangla version indicated the internal consistency of the scale.

2.3.2. Study habit scale

The Bangla version of the study habit scale is developed by Karim & Banu (2000). This is a 5 point Likert scale consists of 77 items with 64 positive and 13 negative items. The responses were scored on a scale from rarely (1) to almost always (5). A reverse score was used for a negative item. The possible range of score is 77-385. The individual's high score indicates sound study habits, and a low score indicates poor study habits. The test-retest reliability of the scale was found to be significant (r=.780). Although the subscales of the scale had not good Cronbach alphas (.47-.88), however, the full scale had a good Cronbach alpha (α=.91).

2.3.3. Academic achievement measure

Students' academic progressive reports for the last two consecutive academic years were obtained from the school registrar. The average score of two academic years was found for each student and then the total score for all students.

2.4. Procedure

Respondents were proportionately drawn from eight selected schools. From each selected school, random sampling was used to pick respondents from identified sample to respond to the instruments. It should be noted here that, respondents were selected from both coeducation and single education schools (boys or girls). They were informed that they were participating in a study concerned with measuring study habits and self-esteem. They were assured that the information gathered from them would be kept confidential and used only for research purposes. Initially, the questionnaires were provided to 480 students at 8 schools. In each school, 60 questionnaires were provided to the students. A questionnaire set was provided to each student and this set was collected from him/her individually. Though a total of 480 questionnaires were provided to students initially, a total of 400 questionnaires were selected finally. The rest of the 80 questionnaires were not considered due to their incomplete filling up. Students who did not understand the questionnaire properly were given necessary explanations. Upon completing the questionnaires, the respondents were given reinforcement and warmly thanked for their cooperation and support.

3. Results

The study's statistical analyses were carried out with the Statistical Package Program for Social Sciences (SPSS-20 version) and Microsoft Excel. The statistical analyses used to analyse the data were: descriptive statistics (e.g., M, SD, and SE), significance tests (e.g., t and F), correlational relationships (e.g., r), and regression analysis (e.g., R and R^2).

There is no significant difference between public and private secondary school students regarding study habit and academic achievement. However, public school students had better self-esteem than their private school counterparts (t=2.29, DF= 398, p<0.05; table 2).

Table 2. *Students' Study Habits, Self-Esteem, and Academic Achievement by School Types*

Variable	School type	N	M	SD	SE	t (2, 398)
Study habits	Public	188	323.51	16.40	1.197	1.55
	Private	212	320.89	17.03	1.170	
Self esteem	Public	188	23.49	2.45	0.179	2.29*
	Private	212	22.80	2.29	0.157	
Academic achievement	Public	188	4.68	0.07	0.005	1.36
	Private	212	4.67	0.07	0.004	

*p<.05

In the following table 3, study habit and self-esteem together accounted for 11.4% variance in academic achievement (R^2= 0.114, p<0.01) when considering both private and public schools together. These two variables accounted for 12.3% (R^2 = 0.123, p<0.01) and 7.5% (R^2 = 0.117, p<0.01) variances in academic achievement regarding public and private schools respectively. Study habit significantly accounted for 4.4% and 2.9% variances in academic achievement in terms of public and private schools respectively. Study habit is a significant predictor of academic achievement regarding both public and private schools. Self-esteem alone significantly accounted 6.0% variance in academic achievement (R^2= 0.060, p<0.01) when considering public and private schools together. Moreover, self-esteem significantly accounted for 6.9% and 4.2% variances in academic achievement regarding public and private schools, respectively. Thus, self-esteem was a stronger predictor to create variations in students' academic achievement.

Table 3. *Single and Combined Influence of Predictors on Academic Achievement*

Predictor	School type	R	R^2	ΔR^2	SE	F
Study habits	Public and Private	0.198	0.039	0.034	5.602	5.41**
	Public only	0.210	0.044	0.039	5.856	3.59*
	Private only	0.169	0.029	0.024	4.112	2.53*
Self esteem	Public and Private	0.246	0.060	0.055	5.612	11.56**
	Public only	0.262	0.069	0.064	5.879	8.23**
	Private only	0.206	0.042	0.037	4.239	2.72*
Study habits and self esteem	Public and Private	0.338	0.114	0.110	6.345	20.68**
	Public only	0.352	0.123	0.119	7.025	12.89**
	Private only	0.274	0.075	0.070	5.635	5.74**

*p<.05; **p<.01

There was the highest positive significant correlational relationship between self-esteem and students' academic achievement (r = 0.291, p<0.01). There were also positive relationships between self-esteem and study habits (r = 0.283, p<0.01), and between academic achievement and study habits (r = 0.268, p<0.01). So, there is a bilateral positive correlational relationship among the three variables. That is, the higher the self-esteem the higher the achievement of students in academics. Similarly, the higher the study habit, the higher the students' academic achievement. The bilateral correlational relationship among the three variables is presented in the following figure 2.
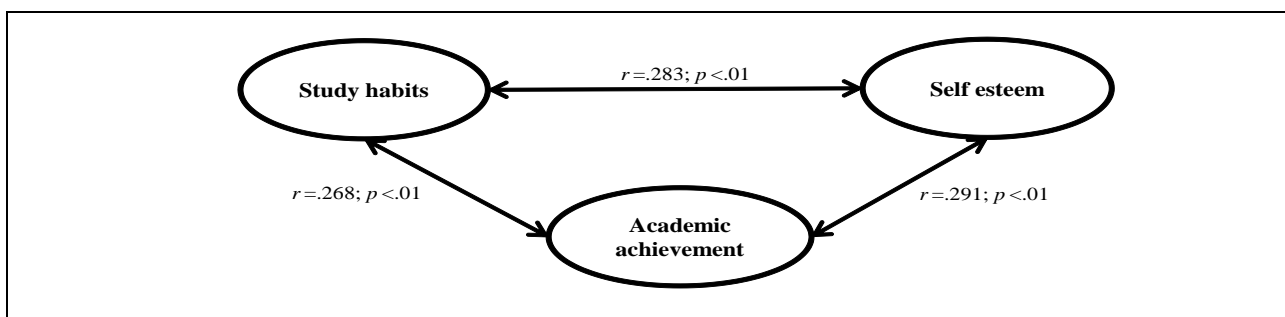

Figure 2. *Relationship Between Study Habits, Self-Esteem, and Academic Achievement*

The significant positive correlations were found between academic achievement and five subscales of the study habit scale. The highest correlation was found between academic achievement and the subscale of 'setting up a schedule for studying' (r =0.281, p<0.01) for public school students, whereas in private schools, the highest correlation was observed for the subscale of 'selecting a definite place to study' (r=0.273, p<0.01). The lowest correlation was found between academic achievement and the subscale of 'setting techniques and strategies for studying' (r =0.201, p<0.05) for public school students, whereas in private schools, the lowest correlation was observed for the subscale of 'preparation for examination' (r=0.188, p<0.05). Correlational relationships between students' different study habits and their academic achievement are presented in table 4.

Table 4. *Correlations Between Five Subscales of Study Habits and Academic Achievement Adopted by Public and Private School Students*

Subscales of study habits	Academic achievement of students	
	Public schools	Private schools
Setting up a schedule for studying	0.281**	0.258**
Selecting a definite place to study	0.267**	0.273**
Setting techniques and strategies for studying	0.201*	0.191*
Preparation for examination	0.237**	0.188*
Reward for studying	0.279**	0.245**

*Correlation is significant at the 0.05 level (2-tailed); **Correlation is significant at the 0.01 level (2-tailed)*

Girls scored higher mean values than their boy's counterparts in terms of all three variables. Study habit (t=5.90, DF=398, p<0.01), self esteem (t=7.15, DF=398, p<0.01), and academic achievement (t=8.06, DF=398, p<0.01) were significantly varied according to gender (see table 5).

Table 5. *Comparison of Boys and Girls by Study Sabits, Self-Ssteem, and Academic Achievement*

Variable	Gender	N	M	SD	SE	t (2, 398)
Study habits	Boys	200	311.73	15.67	1.108	5.90**
	Girls	200	321.47	17.32	1.224	
Self esteem	Boys	200	22.20	2.41	0.170	7.15**
	Girls	200	23.80	2.02	0.142	
Academic achievement	Boys	200	4.65	.070	0.004	8.06**
	Girls	200	4.71	.078	0.005	

4. Discussion

In Bangladesh, it is generally believed that a student's academic performance is only the gateway to success. Since students' success in life rests solemnly on academic achievement, the study measured secondary school students' academic achievement considering two influential factors of study habit and self-esteem. Students from public schools scored higher than their private school counterpart in respect to all three variables. Though public school students scored higher than private, the school effect was not significant on study habits and academic achievement. But, the public school effect was significant over private in self-esteem. Braun et al. (2006) and Colquhoun and Bourme (2012) found the same results. However, the opposite result was found by Eremie and Chikweru (2015), in which the authors found a higher level of self-esteem among private school students than public school students. In terms of three variables, girls' significantly scored higher than their boys' counterpart. This finding concurs with previous reports (Jacobs, 2002; Colquhoun & Bourme, 2012). However, the opposite result by Farid and Akhar (2013) found a higher level of self-esteem among boys than girls. Girls succeed over boys in school because they are more apt to make plans in advance, set academic goals, and put more effort into achieving those goals. Study habits overall and their five dimensions (i.e. setting up a schedule for studying, selecting a definite place to study, the reward for studying, preparation for the examination, setting techniques and strategies for studying) was significant with academic achievement. Students' who had proper study habits and plans predicted positive academic achievement, while those who had poor study habits and plans (i.e. low orientation skills, inappropriate study schedule, poor learning strategies and techniques, lack of time and effort, etc.) lead to academic failure. The findings are consistent with more previous studies (e.g. Bashir & Mattoo, 2012; Mendezabal, 2013; Osa-Edoh & Alutu, 2012).

Students' with high self-esteem scored high in academic achievement and were more confident about academic success, while the students' with low self-esteem decreased achievement and were less confident in educational attainment. This finding concurs with more past findings (Ross & Broh, 2000). Successful students with more academic abilities have an overview of themselves, and their academic self-esteem influences their overall self-esteem. It reflects a person's overall appraisal of his or her own worth. Thus, students with more moderate academic abilities compensate for their academic success by uplifting their general self-esteem (Pullmann & Allik, 2008). Few findings support the strong relationship between study habits and self-esteem, but a positive relationship found in some studies that support the present study (Nyamu, 2007). Study habits and self-esteem together and are a significant predictor of academic achievement among public and private school students.However, a more significant influence of public school is on the academic achievement of private school students.However, a more significant influence of public school is on the academic achievement of private school students.That means public school students met the parents' and society's expectations, developed positive self-esteem, settled up proper study habits, and performed well in school examinations. Public schools in Bangladesh have skilled and professionally sound teachers, better pupil-teacher ratios, more educational equipment and aids, a substantial financial allocation from the government, better admission procedure etc., causing its effects on private schools. Hence, the differences in the facilities available in public and private secondary schools are evident in our country. This result was fitted by the past study of Alimi et al. (2012).

Significant positive relationships found among study habit, self-esteem, and academic variables. The bilateral relationship among the variables proposed a new assumption on whether study habits and self-esteem are correlated with academic achievement, are study habits and self-esteem necessarily be correlated. Since study habits and self-esteem both positively correlated with academic achievement, the correlation between study habits and self-esteem could well be positive. Thus, the study correctly established the above assumption. The field theory in this context implies that the whole environment of learning including study habits well rated by the students helping them score better academic performance. Maslow's theory supports the study; students had good motivational processes to achieve academic success because they had fulfilled physiological and safety needs to form appropriate study habits. Since students' self-esteem was good, it might because they were well-judged or respected by others in the form of academic success or had well self-confidence might lead to their academic attainment in the future.

5. Conclusion and Recommendation

The students from public schools were proved to be good from private schools regarding all three variables (study habits, self-esteem, and academic achievement).Similarly, the girls were proved to be good in respect to all three variables. There were positive bilateral correlational relationships among three study variables. Students' study habits were significant as these habits were significantly positively correlated with their academic achievement. In respect to whatever the school type, study habits and self-esteem were the significant predictors in explaining students' academic achievement. The study results might help the researchers establish a solid foundation in private vs public secondary school context. Regarding all variables, private school students scored lower scores than their public school counterparts. Stakeholders who are involved in private schools should take initiatives to improve their student's self-esteem. Therefore, the following recommendations have been made: (a) parents, teachers, psychologists, and counselors should endeavour to help students to develop positive self esteem through hard working and optimism in private schools; (b) assisting the students through teaching and training on how to improve their study habit and self esteem; (c) both parents and teachers should create and encourage relaxed atmosphere for students; (d) there is need for continual development of school facilities, skilled teachers, seeking school recognition, etc. especially in private schools to ensure students' school acceptance that make them a feedback to develop self esteem; and (e) it needs to ensure that students will be accepted unconditionally by their environment (i.e. home, school, group, etc.), they will have freedom, positive regard, and should be provided study plans to make learning easy.

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Investigation of Emotional Labor in Teaching

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ARTICLE INFO	ABSTRACT
	Teaching, as a profession, involves high levels of emotional labor. This aspect of teaching makes it distinct from other lines of work. It is an emotion-based profession, and good practice of teaching is full of positive emotions. This positivity is a must in the teacher's relationship with his/her students to ensure a healthy classroom atmosphere. The purpose of this study was to examine teachers' emotional labor behaviors based on various variables. This study was designed as a descriptive survey model, conducted on 556 teachers working in 21 different schools in İstanbul. With a stratified sampling method, the study data were collected through a measuring tool consisting of 'Personal Information Form' and 'Emotional Labor Scale'. Percentage (%), frequency (f), standard deviation (s), mean score (x) values were calculated, and One-Way ANOVA tests and T-test were performed. As a result of the research, it was found that teachers' overall emotional labor behavior level was medium. The highest average score, which was collected under the factor of "genuine emotions," is "high"; the lowest average score, which was collected under the "surface acting" factor, is "low", and teachers' deep acting level was "medium." Teachers' emotional labor levels vary based on gender, profession, and school type. On the other hand, teachers' emotional labor levels do not vary according to their age, tenure, and education level. The findings were discussed, and recommendations were made to the practitioners and researchers.

1. Introduction

The most significant characteristics that distinguish humans from other organisms are their mental abilities and feelings. Emotions have a significant effect in determining people's attitudes and behaviours (Hochschild, 1983). Especially in recent years, "Emotional Labor" draws attention as an indispensable and expected service sector component. Teachers are at the forefront of the service sector; they are always face-to-face with the students, administrators, and parents and are expected to meet and communicate with them. Emotional labor is also considered an essential component of the education sector (Hochschild, 1983, Wharton, 1999; Sutton and Wheatley, 2003). Because of this, evaluation of the emotional and cognitive responses of children in different age groups to continuous education and training is crucial for, for teachers, whose job is to guide the students (Beğenirbaş & Yalçın, 2012).

Studies show that the profession of teaching is requires the highest level of emotional labor (Hochschild, 1983). According to Goodwin, Groth, and Frenkel (2011), teaching is a profession that requires displaying a cheerful and lively disposition or being neutral when needed. Emotional labor research provides teachers with awareness on this issue and aims to improve the strategies for using emotional labor (Ertürk, Kara & Güneş, 2016). In this context, this study aims to examine the emotional labor behaviors of teachers based on various variables. The study contributes to the field with a high number of participants from different professions and school types.

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1.1. Emotional Labor

Emotional labor can be defined as expressing the emotions desired by organizations (Morris and Feldman, 1997). It includes evaluating when to express feelings and when not to, assessing inappropriate expressions of emotion, and managing and regulating such expressions. Grandey (2000) defines it both as feelings and expressions of emotions for organizational purposes. In the organizational context, emotional labor involves employees displaying the expected feelings during service encounters (Akın et al., 2014). There are three criteria suggested by Hochschild (1983) for teaching to meet as a profession that involves emotional labor: (1) Values such as cultural expectations of professional standards which are imposed on teachers as external control on their emotional labor; (2) Direct interaction of teachers with their colleagues, students and their parents; (3) producing specific frames of mind (such as excitement, concern, the happiness of fear) (e.g., excitement or anxiety, joy or fear) in their students or other people around them (Winograd, 2003).

Three strategies of performing emotional labor are surface acting, deep acting, and genuine emotions. Hochschild (1983) defines surface acting as employees expressing the behavior's expected by their organization, whether their inner feelings are the same as their behavior's or not. On the other hand, deep acting aims to change the inner feelings to match the demonstrated behaviour (Grandey, 2000; Hochschild, 1983). In other words, in surface acting, the person plays a superficial role to mask his/her true feelings, expressing different emotions on the outside (Grandey, 2003); while in deep acting, the person strives to focus on the inner emotions in order to feel the desired role, just like an actor or an actress (Brotheridge & Grandey, 2002). In a sense, deep acting employees put themselves in customers' shoes and empathize (Rupp et al., 2008). The third dimension of emotional labor consists of genuine emotions or naturally felt emotions. Diefendorff et al. (2005) specified that feeling sad about a customer's problem exemplifiesgenuine emotion. They empirically studied genuine emotions to show the differentiation between surface and deep acting.

The research showed that deep acting had a positive relationship with organizational attachment and customer satisfaction. People who engaged in deep acting were also more likely to feel a sense of personal accomplishment (Hülsheger & Schewe, 2011). Wang et al. (2011) had similar results in their research.

Regarding individual well-being, they found that deep acting was statistically unrelated to depersonalization and emotional exhaustion. In addition, deep acting was negatively related to a reduced sense of personal accomplishment and had a small but significant negative relationship with psychosomatic complaints. Deep acting was positively related to both non-self-reported task performance, self-reported task performance, and job satisfaction. In addition to Kammeyer-Mueller et al. (2013) used a meta-analytic structural model to test the effects of deep acting on job performance and stress. They found that deep acting was positively related to job performance and satisfaction and unrelated to stress/emotional exhaustion.

There are two studies on the commonness of deep acting, surface acting, and genuine emotions among employees. Dahling and Perez (2010) researched how emotional labor strategies are affected depending on personal characteristics. The result was that natural feelings and genuine emotional labor were more common among senior employees. Since senior employees presumably have more professional experience and have undergone more emotional labor, the study also points out that employees with greater skill levels are more prone to have genuine feelings about their job. Kiffin-Petersen et al. (2008) found that genuine emotions and deep acting were the most efficient emotional labor forms. Twenty-eight per cent of employees in their study were found to be skilled at performing both. A mere 4 per cent have used all three types of emotional labor, implying that surface acting is rarely used alongside genuine emotions and deep acting.

1.2. Emotional Labor in Teaching

Teaching, as a profession, involves high levels of emotional labor. This aspect of teaching makes it distinct from other lines of work. It is an emotion-based profession, and good practice of teaching is full of positive emotions. This positivity is a must in the teacher's relationship with his/her students to ensure a healthy classroom atmosphere (Akın et al., 2014). In that respect of teaching, emotional labor is primarily perceived as a process during which teachers try to manage, generate, and inhibit their feelings and expressions of emotion according to expectations and the normative beliefs held about the teaching profession. For effective emotional labor, some specific strategies are required for teachers to regulate their feelings and emotions when working (Yin et al., 2013).

Given that learning, providing guidance, and teaching are not the only processes that deal with emotions, they are always emotional by nature (Hargreaves, 2001). For example, a teacher expressing anger in class is considered an unhealthy example (Liljestrom, Roulston, & deMarrais, 2007), and these emotions should be controlled to avoid such occurrences (Noor and Zainuddin, 2011).

Winograd's (2003) self-study reveals five emotional rules for teachers: (1) to love their work; (2) to avoid the display of extreme emotions like anger, joy, and sadness; (4) to love and to show enthusiasm for students; (3) to be enthusiastic and passionate about the subject matter; (5) to have a sense of humour and laugh at their own mistakes and the peccadilloes of students. The researchers agree that teaching involves emotional labor. If teachers cannot manage their emotions appropriately according to the rules, they will be treated as unprofessional. As a result, teachers need to perform emotional labor (Tsang, 2011; Zembylas, 2002, 2005).

Akın and his colleagues (2014) found that senior teachers have higher levels of emotional labor. Their results highlight considering ways to enhance emotion regulation skills for inexperienced and recently qualified staff and the need for teacher-training programs to raise awareness of the emotional demands of teaching.

Şat and his colleagues (2015) found significant differences in sub-dimensions of emotional labor in terms of marital status, gender, educational background, types of institution, and teachers' seniority. Also, Ertürk et al. (2010) found that male teachers' emotional labor behaviour levels are higher than female colleagues. Similarly, primary school teachers had higher levels than high school teachers. Teachers aged 41 and over had higher levels than teachers aged 40 and under 40. Teachers with 16 years and more seniority had higher levels than seniority between 1-5 years. Bıyık and Aydoğan (2014) found that the emotional labor levels of male teachers are higher than female teachers; teachers with higher seniority tend to spend more emotional labor than those with less seniority. In addition, Polatkan (2016) found that male teachers' deep acting levels were statistically higher than female teachers. The genuine acting levels of teachers who love their jobs were meaningfully higher than those who do not. The level of deep acting of teachers who were over 46 is meaningfully higher.

Akbaş and Bozkurt Bostancı (2019) found that teachers' emotional labor level shows differences in gender, working period in the same school, and seniority. It has been determined that in the following examples, the former ones respectively have higher levels of emotional labor than the latter ones: teachers who have been working for longer compared to those who have been working shorter in the same school; male teachers compared to female teachers, and senior teachers compared to junior teachers. Contrary to this, Özgün (2015) and Ceylan (2017) found that teachers' emotional labor level does not differ in seniority.

Researchers found that male teachers' deep acting, and surface acting levels were meaningfully higher than female teachers (Ceylan, 2017; Kadan & Aral, 2018, Yakar, 2015). Baş (2012) found that the emotional labor levels of female employees were higher than their male counterparts. On the other hand, Kaya (2009) found that teachers' emotional labor behaviours do not vary according to institution roles, experience in the institution, or gender. Köksel (2009) found that emotional labor levels do not vary according to gender.

Some researchers found that emotional labor behaviors' of teachers were at a moderate level (Akbaş & Bozkurt Bostancı, 2019; Beğenirbaş & Meydan, 2012; Ertürk et al., 2010; Savaş, 2012); and other researchers found that emotional labor behaviours of teachers were at a high level (Akın et al., 2014, Aytekin Uysal, 2007; Brown et al., 2014; Ceylan, 2017, Yılmaz et al., 2015). Polatkan (2016) found that secondary school teachers' emotional labor level was highest on surface acting, followed by genuine and deep acting. Akın et al. (2014) found that the emotional labor levels of teachers were 4.53 for genuine emotions, 4.47 for deep acting, and 3.99 for surface acting on a five-point Likert scale. The female teachers used surface acting and deep acting behaviours significantly more often than the male teachers do.

This study aims to examine teachers' emotional labor behaviours based on various variables. With this purpose, the study has sought to answer the following questions:

1. What is the level of teachers' emotional labor?
1a. What is the level of teachers' surface acting?
1b. What is the level of teachers' deep acting?
1c. What is the level of teachers' genuine emotions?

2. Do primary teachers' emotional labor levels (surface acting, deep acting, genuine emotions) significantly vary according to various variables?
2a. Do teachers' emotional labor levels significantly vary according to gender?
2b. Do teachers' emotional labor levels significantly vary according to age?
2c. Do teachers' emotional labor levels significantly vary according to tenure?
2d. Do teachers' emotional labor levels significantly vary according to education level?
2e. Do teachers' emotional labor levels significantly vary according to the profession?
2f. Do teachers' emotional labor levels significantly vary according to school type?

2. Method

2.1. Research Model

This study aims to examine teachers' emotional labor behaviors based on various variables. For research purposes, this study was designed as a descriptive survey model, which seeks to determine the presence and degree of a change between two or more variables (Karasar, 2013).

2.2. Population and Sample

The universe of the research study consists of 9.597 public school teachers in Küçükçekmece and Bağcılar districts, within the borders of İstanbul province. The sample group of the research includes 556 teachers who work in 21 different regions of Istanbul in the schools of the Ministry of National Education. The sample group was determined by stratified sampling. Subgroups in the universe are identified and represented in the sample by their current proportions in the universe. The number of samples selected from each layer relies on the number of units of that layer (Karasar, 2013). A stratified sampling universe has homogeneous layers. Sample from layers have been selected, and the selections were combined. In stratified sampling, boundaries are used in the presence of substrates or subunit groups in a specified universe (Kılıç, 2013). In this research, stratified sampling was used, considering that the responses from different geographical regions may vary. Teachers' personal variables within the scope of the research are given in Table 1 below.

Table 1. *Teachers' Personal Variables*

Variable	Variable Value	Percentage (%)
Gender	Female	65,5
	Male	34,5
Age	25 and under	5,3
	25-34 years old	44,8
	35-44 years old	35,5
	45-54 years old	11,3
	55 and above	3,1
Tenure	1-5 years	24,7
	6-10 years	31,0
	11-15 years	16,3
	16-20 years	16,1
	20-25 years	6,6
	26 years and above	5,1
Education Level	Graduate	87,5
	Master and doctorate	12,5
Profession	Pre-school teacher	11,4
	Primary school teacher	24,7
	Branch teacher	57,9
	School manager	6,1
School type	Kindergarten	9,8
	Primary school	29,1
	Secondary school	27,3
	Anatolian high school	18,0
	Vocational high school	15,8

As shown in Table 1, 65,5% of the participants were female; the majority were between 25-34 years old (44.8%); 57.9% were branch teachers; 87.5% have graduate degrees, 29,1% of them work in primary schools.

2.3. Data Collection Tools

The study data were collected with a measuring tool, which consists of 'Personal Information Form' and 'Emotional Labor Scale.' The description of the measurement tool has been given below.

Personal Information Form: The questionnaire prepared by the researcher was used to determine some of the characteristics of the participants (gender, age, tenure, education level, profession, school type).

Emotional Labor Scale: The Scale was created by Diefendorff et al. (2005) and was adapted to Turkish in the teacher sample by Basım and Beğenirbaş (2012). The scale has three dimensions, surface acting, deep acting, and genuine emotions. The participants were evaluated with the help of the five-point Likert Scale (1 = Never, 5 = Each Time). Surface acting was measured in scale by six items, deep acting by four items, and genuine emotions by three items. The internal consistency of the scale has been calculated as .80 (Basım & Beğenirbaş, 2012). In this study, Cronbach's alpha = .85 for the surface acting sub-dimension, Cronbach's alpha = .87 for the deep acting sub-dimension, and Cronbach's alpha = .83 for the genuine emotions sub-dimension. The Cronbach's alpha value for the overall scale is .77.

Based on the assumption that the scale was equally spaced, the score range coefficient for the arithmetic means was 0.80. Score Range = (Highest Value-Lowest Value) / 5 = 4/5 = 0.80. Accordingly, the evaluation range of arithmetic means is "very low" between 1.00-1.80, "low" between 1.81-2.60,"medium" between 2.61-3.40, "high" between 3.41-4.20, "very high" between 4.21-5.00 (Gömleksiz & Bulut, 2006; Tanuğur et al., 2013).)

2.4. Data Analysis

The data collected for the research study were analyzed by using SPSS 23 program. The normality of the data was examined with the Kolmogorov Smirnov Test, and it was determined that the data have a normal distribution (p>.05; p=,300). In this case, One Way ANOVA, Independent Samples T-test was employed to analyse the data among parametric tests.

The levels of teachers' emotional labor were calculated by using arithmetic means and standard deviation. For determining whether teachers' emotional labor differs according to the variables of gender and education level, Independent Samples T-test was conducted. One Way ANOVA was used to determine whether teachers' emotional labor differs according to the age, tenure, profession, and school type variables.

3. Findings

1. The first sub-question of the study is 'What is the level of teachers' emotional labor?' The values of the mean score (x) and standard deviation (S) of this sub-problem are given in Table 2.

Table 2. *Descriptive Statistics Findings*

Surface Acting (F1)	x	S
I playact to properly deal with students.	2.16	1.13
I wear a mask to show the emotions required by my profession.	1.93	1.05
I act as if I feel the emotions that I do not feel while doing my profession.	1.87	1.05
I act as if I feel good when dealing with my students.	2.00	1.04
I show my students different emotions than I really feel.	1.86	0.97
When I take care of the students, I perform extra performance as if I were doing a show.	2.43	1.23
Overall score of surface acting	*2.04*	*4.90*
Deep Acting (F2)	x	S
I do my best to feel the emotions I have to show the students.	3.34	1.34
I make an intense effort to make the students feel the emotions that I have to show.	2.97	1.38
I really try to experience the emotions I have to show students.	2.21	1.32
I make an effort to feel the emotions I have to show in reality.	2.63	1.34
Overall score of deep acting	*3.05*	*4.60*
Genuine Emotions (F3)	x	S
The feelings I show students are sincere.	4.37	.79
The feelings I show students are the same as what I felt at that moment.	4.12	.92

The emotions I show to the students emerge spontaneously.					4.00	.95	
Overall score of genuine emotions					*4.16*	*2.32*	
Overall score of emotional labor					*2.83*	*7.56*	

The average scores given by the teachers to the emotional labor scale are given in Table 2. As can be seen in Table 2, the highest average scores were collected under the factor of "genuine emotions" ("high" between 3.41-4.20); the lowest mean scores were collected in the "surface acting" factor ("low" between 1.81-2.60), and teachers' deep acting level were "medium" between 2.61-3.40.

The items with the highest average score on the scale are the following: "The feelings I show students are sincere." (x= 4.37), "The feelings I show students are the same as what I felt at that moment." (x= 4.12), "The emotions I show to the students emerge spontaneously." (x= 4.00). The items with the lowest score are the following: "I show my students' different emotions than I really feel. (x= 1.86), "I act as if I feel the emotions that I do not feel while doing my profession." (x= 1.87), "I wear a mask to show the emotions required by my profession." (x= 1.93). When the scale was evaluated as a whole, it was found that teachers' emotional labor levels were "medium" between 2.61-3.40.

The second sub-problem of the study is 'Do teachers' emotional labor level (surface acting, deep acting, genuine emotions) vary according to various variables?' The results show that teachers' emotional labor levels vary according to gender, profession, and school type. On the other hand, teachers' emotional labor levels do not vary according to their age, tenure, and education level. The relationships between various variables and teachers' emotional labor levels are shown in the tables below.

The results of the t-test conducted to measure the effect of gender on the emotional labor behaviour of teachers are given in Table 3.

Table 3. *The Level of Teachers' Deep Acting (T-Test) According to Gender*

	Gender	n	X	S	df	t	p	
Deep Acting	Female	362	11.98	4.77	554	-1.46	.000	**
	Male	194	12.59	4.24				

** $p<0.01$

According to the study's findings, male teachers show deeper acting behaviours (t = -1.46, p <0.01) than female teachers. On the other hand, teachers' surface acting and genuine emotions do not vary according to gender.

The ANOVA results conducted to measure the effect of the age on emotional labor behaviour of teachers are given in Table 4.

Table 4. *The Level of Teachers' Emotional Labor (ANOVA) According to the Age*

	Age	N	$\bar{X}$	Sd	df	F	p	Sig.
Emotional Labor Total	25 and under	29	35.92	7.03	4	0.37	.829	*
	25-34 years old	249	37.17	7.64				
	35-44 years old	198	36.97	7.38				
	45-54 years old	63	36.80	7.64				
	55 and above	17	35.0	9.50				

* $p>0.05$

According to the study's findings, emotional labor levels are not age-dependent (F=0.37, p>0.05).

The ANOVA results conducted to measure the effect of the tenure on emotional labor behaviour of teachers are given in Table 5.

Table 5. *The Level of Teachers' Emotional Labor (ANOVA) According to the Tenure*

	Age	N	$\bar{X}$	Sd	df	F	p	Sig.
Emotional Labor Total	1-5 years	138	37.60	7.24	5	1.43	.209	*
	6-10 years	173	36.69	7.41				
	11-15 years	91	36.15	7.39				
	16-20 years	90	38.31	8.13				
	20-25 years	36	37.19	6.84				
	26 years and above	28	34.27	8.90				

* $p>0.05$

According to the study's findings, emotional labor levels do not depend on tenure (F=1.43, p>0.05). The results of the t-test conducted to measure the effect of education level on the emotional labor behaviour of teachers are given in Table 6.

Table 6. *The Level of Teachers' Emotional Labor (T-Test) According to Education Level*

	Education Level	n	X	S	df	t	p	Sig.
Emotional Labor Total	Graduate	486	36.75	7.64				
	Master and Doctorate	70	38.22	7.71	554	-1.313	.969	*

*p>0.05

According to the study's findings, emotional labor levels do not depend on education level (t=-1.313, p>0.05).

The ANOVA results to measure the impact of the profession on the emotional labor behaviour of teachers are given in Table 7.

Table 7. *The Level of Teachers' Genuine Emotions (ANOVA) According to the Profession*

	Profession	N	$\bar{X}$	Sd	df	F	p	Sig.
Genuine Emotions	1-Pre-school teacher	65	12.66	2.20				
	2-Primary school teacher	134	12.94	2.04	3	3.12	.02*	2-3
	3-Branch teacher	323	12.24	2.43				
	4-School manager	34	12.72	2.40				

According to the findings of the study, primary school teachers' genuine emotions levels are higher than branch teachers' (F=3.12, p <0.05). On the other hand, teachers' surface acting and deep acting levels do not vary according to the profession.

The ANOVA results to measure the effect of school type on the emotional labor behaviour of teachers are given in Table 8.

Table 8. *The Level of Teachers' Emotional Labor (ANOVA) According to the School Type of Teachers*

	School type	N	$\bar{X}$	Sd	df	F	p	Sig.
Emotional Labor Total	1-Kindergarden	55	36.36	6.62				
	2-Primary School	158	36.51	7.68				
	3-Secondary school	154	38.58	7.75	4	3.684	.000**	3-5
	4-Anatolian High School	100	36.39	7.19				
	5-Vocational High school	89	34.75	7.45				
Deep Acting	1-Kindergarden	55	12.36	4.71				
	2-Primary School	158	12.05	4.52				
	3-Secondary school	154	13.13	4.71	4	3.651	.000**	3-5
	4-Anatolian High School	100	11.80	4.41				
	5-Vocational Hig school	89	10.79	4.41				
Genuine Emotions	1-Kindergarden	55	12.88	2.08				
	2-Primary School	158	12.74	2.32				1-5
	3-Secondary school	154	12.75	1.91	4	4.732	.000**	2-5
	4-Anatolian High School	100	12.35	2.46				3-5
	5-Vocational Hig school	89	11.59	2.75				

According to the study's findings, teachers' deep acting, genuine emotions, and total emotional labor levels differ according to the profession. Secondary school teachers' deep acting (F=3.65, p <0.01), genuine emotions (F=4.73, p <0.01) and total emotional labor (F=3.68, p <0.01) levels are higher than vocational high school teachers. Similarly, kindergarten and primary school teachers' deep acting (F=3.65, p <0.01) and genuine emotions (F=4.73, p <0.01) levels are higher than vocational high school teachers.

4. Conclusion and Discussion

In this section, the research findings are discussed, with previous research findings also taken into consideration. Teachers' overall emotional labor behaviour level was "medium." The highest average score, which was collected under the factor of "genuine emotions", is "high"; the lowest average score, which was

collected in the "surface acting" factor, is "low" and teachers' deep acting level was "medium". While some researchers (Akbaş &Bozkurt Bostancı, 2019; Beğenirbaş & Meydan, 2012; Ertürk et al., 2010; Sagas, 2012) found that emotional labor behaviours of teachers were at a medium level; other researchers (Akın et al., 2014, Aytekin Uysal, 2007; Brown et al., 2014, Ceylan, 2017; Yılmaz et al., 2015) found that emotional labor behaviours of teachers were at a high level. Akın et al. (2014) found that the emotional labor levels of teachers were 4.53 for genuine emotions, 4.47 for deep acting, and 3.99 for surface acting on a five-point Likert scale. These research findings are consistent with the current findings. According to the research results, the surface acting had a negative effect, whereas deep acting and genuine emotions had a positive effect on positive organizational behaviour such as job performance (Kim et al., 2017; Lee et al., 2015; Wang et al., 2016; Totterdell & Holman, 2003;) and job satisfaction (Bhave & Glomb, 2016; Chen et al., 2012, Brotheridge & Grandey, 2002; Brotheridge & Lee, 2002; Cheung & Tang, 2009, Cheung & Tang, 2010; Cheung et al., 2011; Hur et al. l, 2015; Park & Han, 2013). The findings suggest the desired result in which a high level of genuine emotions and low-level surface acting increase positive organizational behaviours such as job performance and job satisfaction. It is an indication that there is a need for studies to increase deep acting from medium level to high level.

It was found that teachers' deep acting levels vary according to gender. Male teachers show deeper acting behaviours than female teachers. Polatkan (2016) found that male teachers' deep acting levels were meaningfully higher than female teachers. Şat and his colleagues (2015) found significant differences in emotional labor subdimensions in terms of gender. Ertürk et al. (2010) found that male teachers' emotional labor behaviour levels higher male than their female counterparts. In addition, Bıyık and Aydoğan (2014) found that the emotional labor levels of male teachers are higher than female teachers. Akbaş and Bozkurt Bostancı (2019) found that male teachers have higher emotional labor levels than female teachers. Researchers (Ceylan, 2017; Kadan & Aral, 2018; Yakar, 2015) found that male teachers' deep acting, and the surface acting level were meaningfully higher than female teachers. Baş (2012) found that the emotional labor levels of female employees are higher than their male colleagues. On the other hand, Kaya (2009) and Köksel (2009) found that teachers' emotional labor behaviours do not vary according to gender. In deep acting, the person strives to focus on the inner emotions to feel the desired role, just like an actor or an actress. The result can be explained. Gender roles: refers to the roles traditionally expected of men and women. While these roles expect men to behave more like they are, they expect women to feel and behave in accordance with social life (Vefikuluçay et. al, 2007).

Teachers' genuine emotions vary according to the profession. Primary school teachers' genuine emotions level is higher than branch teachers. This finding is explained by the fact that primary school teachers' study with younger students and for longer hours than branch teachers do. Therefore, they would need to perform more emotional labour behaviour than others do. Inconsistent with this research's results, Kaya (2009) found that teachers' emotional labor behaviours do not vary according to institution roles.

Teachers' deep acting, genuine emotions, and total emotional labor levels differ according to school type. Secondary school teachers' deep acting, genuine emotions, and total emotional labor levels are higher than vocational high school teachers. Similarly, kindergarten and primary school teachers' deep acting and genuine emotion levels are higher than vocational high school teachers' teachers do. It is thought that student's ages and needs can explain this situation. Ertürk et al. (2010) found that primary school teachers have higher levels of emotional labor behaviour compared to high school teachers. On the other hand, Kaya (2009) found teachers' emotional labor behaviours do not vary according to institution roles.

It was found that teachers' emotional labor levels do not vary according to age, tenure, and education level. Dahling and Perez (2010) found that senior employees express their naturally felt emotions, and they were more genuine in their emotions. Since senior employees presumably have more professional experience and have undergone more emotional labor, their study also points out that employees with greater skill levels are more prone to have genuine feelings about their jobs. Şat and his colleagues (2015) found significant differences in emotional labor subdimensions in terms of educational background and seniority of teachers. Akın and his colleagues (2014) found that more experienced teachers reported higher levels of emotional labor. Ertürk et al. (2010) found that teachers aged 41 and over have higher levels of emotional labor behaviour than teachers aged 40 and under, and teachers with seniority 16 years and more have higher levels than those who have seniority between 1-5 years. Bıyık and Aydoğan (2014) found that teachers with higher seniority tend to spend more emotional labor than those with less seniority. The level of deep acting of teachers who were over

46 is meaningfully higher. Akbaş and Bozkurt Bostancı (2019) found that senior teachers have higher emotional labor levels than junior teachers. Contrary to this, Özgün (2015) and Ceylan (2017) found that teachers' emotional labor level does not differ in seniority. Kaya (2009) found that teachers' emotional labor behaviours do not vary according to experience in the institution.

5. Recommendations

In this section, recommendations based on the research findings are presented under two headings: practitioners and researchers.

Recommendations for Practitioners

- Deep acting has a positive correlation with professional satisfaction and task performance, both self-reported and non-self-reported. Since teachers' deep acting level was found as "medium", it is recommended to conduct studies to raise the deep acting level higher.
- Male teachers have higher deep acting levels than female teachers do. Thus, it is recommended to conduct studies to raise the level of female teachers' deep acting behaviour.
- Kindergarten, primary, and secondary school teachers' deep acting and genuine emotions levels are higher than vocational high school teachers. It is recommended to conduct studies to raise vocational high school teachers' deep acting and genuine emotional behaviour levels.

Recommendations for Researchers

- This study was conducted in public schools. It is considered that it would be beneficial to conduct similar research in private schools as well.
- Primary school teachers' genuine emotions levels are higher than branch teachers. The finding will present a starting point for future qualitative studies. Researchers could explain the results with qualitative studies such as "focus group interview" and "observation".

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Measuring Cognitive Engagement: An Overview of Measurement Instruments and Techniques

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ARTICLE INFO	ABSTRACT
	This paper adopted an analytical perspective to review cognitive engagement measures. This paper provided a comprehensive understanding of the instruments/techniques used to measure cognitive engagement, which could assist researchers or practitioners in improving their measurement methodologies. In particular, we conducted a systematic literature search, based on which the current practice in measuring cognitive engagement was synthesized. We organized and aggregated the information of cognitive engagement measures by their types, including self-report scales, observations, interviews, teacher ratings, experience sampling, eye-tracking, physiological sensors, trace analysis, and content analysis. We provided a critical analysis of the strength and weaknesses of each measurement method. Recommendations for measuring cognitive engagement were also provided to guide future empirical work in a meaningful direction.

1. Introduction

The literature on student engagement is diverse, reflected in a plethora of engagement-related terminologies (e.g., student engagement, school engagement, academic engagement, and task engagement) and a vague understanding of engagement components. For instance, Fredricks, Blumenfeld, and Paris (2004) differentiated between three dimensions of engagement: behavioural, emotional, and cognitive. Whereas Finn and Zimmer (2012) state that researchers use four dimensions of engagement repeatedly in the literature, namely, academic, social, cognitive, and affective engagement. While many issues are yet to be answered in engagement studies, an essential issue that needs to be content with is the appropriate measurement of engagement. If the measurement instruments cannot precisely capture the construct, the data collected for interpretation would be problematic, and no meaningful conclusions can be guaranteed.

This review pays particular attention to the cognitive component of engagement, focusing on its measurement instruments and techniques. One reason is that educational psychologists and instructors traditionally emphasized cognition and metacognition in predicting students' performance. Another consideration is that this review aims to facilitate a concise but detailed discussion on a specific engagement phenomenon (i.e., cognitive engagement) since a general review of student engagement may raise more questions than it answers. Moreover, recent years have witnessed a surge in the use of advanced techniques, for example, eye tracker, EEG (Electroencephalograph) sensor, and text mining techniques, to capture students' in-time cognitive engagement. However, studies vary radically in how they operationalize cognitive engagement, depending on the researchers' conceptualizations of this construct, the grain size of measurement (e.g., institution, class, or task level), and the types of data that are available for collection in a given circumstance.

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As an illustration, Table 1 shows some definitions of cognitive engagement widely used in the literature. Nevertheless, these definitions differ from each other regarding granularity and focus.

Table 1. *Some Definitions of Cognitive Engagement*

Study	Definition	Level of Granularity	Focuses
Furlong and Christenson (2008)	The extent to which students perceive the relevance of school to future aspirations. It is expressed as interest in learning, goal setting, and the self-regulation of performance	School and Task levels	Motivation - Interest; Being strategic or self-regulating
Rotgans and Schmidt (2011)	The extent to which students are willing and able to take on the learning task at hand	Task level	Motivation – Level of autonomy
Appleton et al. (2006)	It includes less observable, more internal indicators, such as self-regulation, the relevance of schoolwork to future endeavours, the value of learning, and personal goals and autonomy	School and Task levels	Motivation – Level of autonomy, goal, value; Being strategic or self-regulating
Richardson and Newby (2006)	The integration and utilization of students' motivation and strategies in the course of their learning	School and Task levels	Motivation; Being strategic or self-regulating
D'Mello, Dieterle, and Duckworth (2017)	Learners' investment in the learning task, such as how they allocate effort toward learning, and their understanding and mastery of the material	Task level	Psychological investment
Fredricks, Blumenfeld, and Paris (2004)	Students' level of investment in learning. It incorporates thoughtfulness and willingness to exert the effort necessary to comprehend complex ideas and master difficult skills.	School and Task levels	Psychological investment
Helme and Clarke (2001)	The deliberate task-specific thinking that a student undertakes while participating in a classroom activity	Task level	Being strategic or self-regulating
Cleary and Zimmerman (2012)	The extent to which individuals think strategically before, during, and after performance on some learning activity	Task level	Being strategic or self-regulating
Li et al. (2021)	The extent to which individuals think strategically across the learning or problem-solving process in a specific task	Task level	Being strategic or self-regulating

Therefore, a review that summarizes the studies that have measured the construct of cognitive engagement is crucial. On the one hand, it will help researchers better understand this divergent research base. On the other hand, a critical review of cognitive engagement measures will provide more insights into the nature of this construct. This study represents a potentially valuable resource for researchers and practitioners about traditional and cutting-edge methods for capturing cognitive engagement.

In short, this paper aims to provide a synthesis of how students' cognitive engagement is measured across various contexts. In particular, this paper adopts an analytical perspective to provide a comprehensive understanding of the instruments/techniques used to measure cognitive engagement and assist researchers or practitioners in improving their cognitive engagement methodologies. As such, this paper distinguishes itself from a systematic review or a meta-analysis by summarizing all available cognitive engagement instruments/techniques that existed in contemporary literature and, at times, using selected literature to serve as examples of the state-of-the-art. This paper also provides a critical analysis of the strength and weaknesses of each measurement method.

2. Methods Used in the Review

This review is based on a broad conception of cognitive engagement regardless of its definition since the overarching goal of this paper is to provide an overview of the current practice in measuring cognitive engagement. We purposefully selected studies in the literature that best described the use of the instruments/techniques of cognitive engagement. Therefore, the studies reviewed in this paper were by no means exhaustive. As aforementioned, this paper was neither a systematic review nor a meta-analysis. Instead,

we used an approach that was similar to qualitative synthesis to accomplish our research goals. To this end, this review included the following three phases: (1) creation of selection criteria and identification of relevant research, (2) critical appraisal and extraction of instruments/techniques concerning the measurement of cognitive engagement, and (3) synthesis of the findings and evaluation of different measurements.

Selection criteria

- Peer-reviewed pieces, ideally full journal papers. Conference proceedings were limitedly used to stay true to the criteria of using peer-reviewed studies. Conference presentations were not included.
- Empirical studies that had sufficient details about the measurement of cognitive engagement. Theoretical discussions and review papers concerning cognitive engagement instruments/techniques were also included as background material.
- Research studies that had explicitly measured the construct of cognitive engagement.
- Studies conducted in student learning or problem-solving settings.
- Studies that had been published in English.
- There were no limitations on the date of publication.

Identification of studies

A systematic literature search was conducted on prominent online databases, including ERIC (ProQuest), Web of Science, Google Scholar, and PsycINFO. The syntax used for the literature search was shown below: (cognitive engagement) AND (measure* OR scale* OR instrument* OR technique* OR tool* OR questionnaire* OR method*) AND (student* OR learn*). The processes of searching for the literature and screening for inclusion were displayed in Figure 1. The search identified 4907 publications in total. By removing duplications and applying the above selection criteria, we narrowed down the publications to 116 full-text articles. Finally, we identified 52 articles that were relevant for this study through full-text reading.
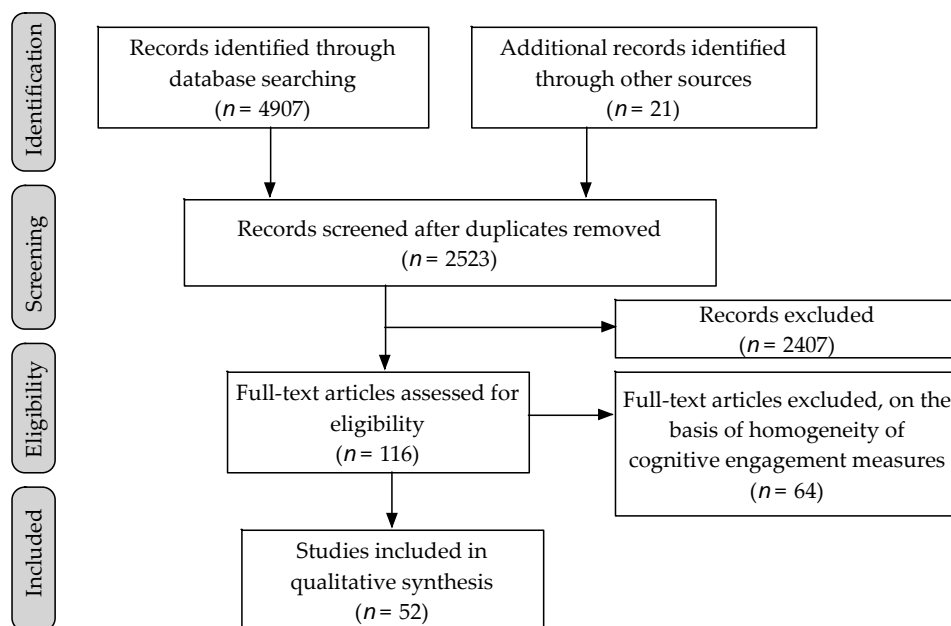
Figure 1. *The Process of Identifying Relevant Studies*

Data extraction and synthesis

We read the full text of each of the 52 articles with a central question in mind: How did the author(s) capture the construct of cognitive engagement? In particular, we extracted applicable information from each study regarding the instrument or technique used to measure cognitive engagement, as well as its definition, characteristics, assumptions, subcomponents, sample items, strength, and weakness. The extracted information served as the basis for literature synthesis. We then organized and aggregated cognitive engagement measures by their types, such as self-reports, observations, or teacher ratings.

3. Current Practice in Measuring Cognitive Engagement

We found that many instruments and methods that intend to measure cognitive engagement exist in the extant literature, including self-report scales, observations, interviews, teacher ratings, experience sampling, eye-tracking, physiological sensors, trace analysis, and content analysis. In general, self-report scales are the most common approach to assessing cognitive engagement (Greene, 2015; Fredricks & Mccolskey, 2012).

Self-report scales

Concerning the operationalization of cognitive engagement, three streams of self-report measures existed in literature, including those scales that emphasized (1) school-related motivations (e.g., students' beliefs about the value of schooling or control of schoolwork), (2) learning strategy use (i.e., cognitive strategies, self-regulatory or metacognitive strategies), and (3) students' mental involvement or psychological investment, such as effort, persistence, and dedication (Fredricks & Mccolskey, 2012). Specifically, the self-report scales that derived from a larger student engagement scale (e.g., cognitive engagement subscale of Student Engagement Instrument) usually contained items that measure school-related motivations and, by their nature, were not context-specific (Fredricks & Mccolskey, 2012; Fredricks et al., 2004). For example, Fredricks et al. (2011) identified 14 self-report scales measuring student engagement, in which only three scales explicitly had subscales labelled *cognitive engagement*: School Engagement Measure (SEM) – MacArthur (Fredricks, Blumenfeld, Friedel, & Paris, 2005), Student School Engagement Survey (SSES) (Finlay, 2006), and Student Engagement Instrument (SEI) (Appleton et al., 2006). Nevertheless, the three instruments asked students about their perceived importance of schooling, control of schoolwork, or future aspirations to represent cognitive engagement in general. None of these instruments measured cognitive engagement in specific learning contexts. The failure of linking cognitive engagement to a target task created confusion among researchers and muddied interpretation of research findings (Greene, 2015). Thus, there is now a growing body of studies reducing the specificity of measuring cognitive engagement to a class or even a specific task.

In terms of the instruments for measuring cognitive engagement in a class- or task-specific environment, much effort has been made to delineate the relevant aspects of this construct and to identify attributes that constitute it. For instance, Greene and her colleagues (2004) viewed cognitive engagement as the same as meaningful cognitive strategies (i.e., deep levels of information processing to connect or integrate new material with one's prior knowledge). Thus their measure of cognitive engagement in the Approaches to Learning Instrument focused on meaningful strategies. Similar to the instruments by Greene et al. (2004), Patrick, Ryan, and Kaplan (2007) also found that a single dimension of self-regulation strategies could constitute the construct of cognitive engagement. Therefore, they measured students' cognitive engagement by assessing the extent to which students plan, monitor, and regulate their cognition. Wolters (2004) also used strategy to represent students' cognitive engagement; however, both cognitive and metacognitive strategies were measured as two dimensions of cognitive engagement in his instrument. Specifically, the measure of cognitive strategies included eight items asking students' use of rehearsal and elaboration strategies. Metacognitive strategies consisted of nine items reflecting students' use of planning, monitoring, and regulatory strategies.

In line with the measure used in Wolters's (2004) research, Meece, Blumenfeld, and Hoyle (1988) assessed students' cognitive engagement in the Science Activity Questionnaire (SAQ) with 15 items on students' use of cognitive strategies and self-regulated learning, such as planning, monitoring, and help-seeking. However, Meece et al. (1988) also included effort-avoidant strategies as indicators of cognitive engagement in the questionnaire, and a sample item was '*I guessed a lot so that I could finish quickly*.' While the SAQ emphasized students' use of effort-avoidant strategies, the Student Engagement in the Mathematics Classroom Scale (SEMCS) that developed by Kong, Wong, and Lam (2003) included reliance along with the other two subscales (i.e., surface strategy and deep strategy) to measure cognitive engagement. According to Kong et al. (2003), reliance refers to students' perceived beliefs about the optimal learning approach and their learning preferences. A sample item was "*I would solve problems in the same way as the teacher does*."

Several conclusions can be drawn from the aforementioned self-report measures of cognitive engagement. First, strategies are generally considered an indicator of cognitive engagement, although researchers frame students' use of strategies differently (e.g., cognitive, metacognitive, deep, shallow or surface strategies). Second, the measures tended to stay close to information processing and self-regulation theories as to the foundational framework. Thus, it is no wonder that some studies applied the Motivated Strategies for

Learning Questionnaire (MSLQ) as a measure of cognitive engagement since it was initially designed to measure strategy use and self-regulation (Pintrich & de Groot, 1990; Fredricks & Mccolskey, 2012). Greene (2015) developed the Motivation and Strategy Use Survey to measure cognitive engagement, which contained similar subscales with the MSLQ, namely, self-regulation, deep strategy use, shallow strategy use, and persistence. Third, little consensus has been reached among researchers about the indicators of cognitive engagement, which are reflected from the variations in dimensions and subcomponents of the measures.

Instead of focusing on strategy use, some researchers measured cognitive engagement the other way around, such as assessing 'how often' students perform self-regulatory behaviours when solving a task. Linnenbrink (2005) proposed that cognitive engagement included both quality and quantity of self-regulation, so she developed two scales (i.e., the Quality of Self-regulation Scale and the Quantity of Self-regulation Scale) for students to report their cognitive engagement. Specifically, the Quality of Self-regulation Scale asks students how often they plan, monitor, and evaluate their problem-solving processes. The Quantity of Self-regulation Scale assesses students' persistence behaviours but emphasizes how often they do so. According to Rotgans and Schmidt (2011), cognitive engagement consisted of three elements: (1) engagement with the task at hand, (2) effort and persistence, and (3) experience of flow or having been completely absorbed by the activity. Based on this understanding, they developed the 4-item Situational Cognitive Engagement Measurements (SCEM) to assess students' levels of cognitive engagement. Similar to the SCEM, the Utrecht Work Engagement Scale for Students (UWES-S) also had nothing to do with students' use of strategies (Schaufeli et al., 2002). In the UWES-S, cognitive engagement was characterized by three components of vigour, dedication, and absorption. In sum, the three scales (i.e., the Quality and Quantity of Self-regulation Scale, SCEM, and UWES-S) contributed to the effective measurement of cognitive engagement by bringing in more variables as indicators of this construct and by trying to capture cognitive engagement without any further inferences.

Table 2 lists the student self-report measures of cognitive engagement discussed earlier and their underlying theoretical foundations, components, and sample items. Along with the challenges for measuring cognitive engagement, such as theoretical contentions on its dimensions and components, the items across different scales are different even though they are designed to describe the same indicator of cognitive engagement. As pointed out by D'Mello et al. (2017), methodological advances have unfortunately lagged behind theoretical developments in this area of research.

Table 2. *Prominent Cognitive Engagement Scales*

Questionnaire	Foundations	Components (items) and Sample Items
Motivation and Strategy Use Survey (Greene, 2015)	Depth of Processing and Self-regulation Theories	**Self-Regulation** (9): *"I organize my study time well for this class."* **Deep Strategy Use** (7): *"I classify problems into categories before I begin to work them."* **Shallow Processing Strategy** (4): *"I try to memorize the steps for solving problems presented in the text or in class."* **Persistence** (8): *"If I have trouble understanding a problem, I go over it again until I understand it."*
Approaches to Learning Instrument (Greene et al., 2004)	Depth of Processing	**Meaningful cognitive strategies** (12): *"I have a clear idea of what I am trying to accomplish in this class."*
The Quantity and Quality of Self-regulation Scale (Linnenbrink, 2005)	Self-regulation Theories	**The Quantity of Self-regulation** (4): *"Even when I do not want to work on math, I force myself to do the work."* **The Quality of Self-regulation** (5): *"When I do math, I ask myself questions to help me understand what to do."*
Situational Cognitive Engagement Measurements (SCEM) (Rotgans & Schmidt, 2011)	Contextual Dependence of Cognitive Engagement	**Engagement at hand** (1): *"I was engaged with the topic at hand."* **Effort & Persistence** (2): *"I put in a lot of effort."* **Experience of flow** (1): *"I was so involved that I forgot everything around me."*
Utrecht Work Engagement Scale for Students (UWES-S) (Schaufeli et al., 2002)	A Positive Psychology View of Engagement	**Vigor** (5): *"When I study, I feel like I am bursting with energy."* **Dedication** (5): *"My studies inspire me."* **Absorption** (4): *"When I am studying, I forget everything else around me."*

Science Activity Questionnaire (SAQ) (Meece et al., 1988)	Depth of Processing and Self-regulation Theories	**Active engagement** (8): *"I tried to figure out how today's work fit with what I had learned before in science."* **Superficial engagement** (7): *"I guessed a lot so that I could finish quickly."*
Not applicable (Patrick et al., 2007)	Self-regulation Theories	**Self-regulation strategies** (6): *"When I finish my math work, I check it to make sure it was done correctly."*
Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich & de Groot, 1990)	Self-regulation Theories	**Cognitive and metacognitive strategies** (31): *"I try to relate ideas in this subject to those in other courses whenever possible."* **Resource management strategies** (19): *"I make good use of my study time for this course."*
Strategy Use Questionnaire (Wolters, 2004)	Self-regulation Theories	**Cognitive strategies** (8): *"When I study for math, I try to connect what I am learning with my own experiences."* **Metacognitive strategies** (9): *"If what I am working on for math is difficult to understand, I change the way I learn the material."*
The Student Engagement in the Mathematics Classroom Scale (SEMCS) (Kong et al., 2003)	Depth of Processing and Approaches to Learning	**Surface strategy** (7): *"I find memorizing formulas is the best way to learn mathematics."* **Deep strategy** (7): *"When I learn mathematics, I would wonder how much the things I have learned can be applied to real life."* **Reliance** (7): *"I would learn what the teacher teaches."*

Note: The UWES-S and the scale used by Patrick et al. (2007) were not explicitly mentioned to measure cognitive engagement, but the items used in these instruments were to measure the cognitive aspect of engagement; Some studies used MSLQ to measure cognitive engagement, but they varied in subscales and items of MSLQ for capturing cognitive engagement.

Observations

Cognitive engagement has also been measured by observational methods at both the individual and classroom levels (Fredricks & Mccolskey, 2012). The underlying assumption is that cognitive engagement can be reliably recognized by specific behavioural and linguistic indicators, verified by some research (Helme & Clarke, 2001; Greene, 2015; Lee & Anderson, 1993). For instance, Helme and Clarke (2001) assessed students' cognitive engagement in a math class using classroom videotape data as a primary source, whereby linguistic indicators of strategy use (e.g., explanations and verbalization of thinking) and non-verbal correlates of cognitive engagement (e.g., gestures and body orientation) had been taken into consideration for measuring this construct. Lee and Anderson (1993) observed science classrooms for indicators of cognitive engagement such as initiating activities to understand science topics, requesting clarification, and applying scientific knowledge to solve real-world problems. Another example is Greene (2015) and her team's observations of students' interactions with teachers to infer students' levels of cognitive engagement in science classes, noting that the observational method was effective in detecting different engagement patterns.

The primary advantage of using observations to measure cognitive engagement is that this approach can provide detailed descriptions of both students' responses and contextual factors to help researchers understand the steady states of students' cognitive engagement (Fredricks & Mccolskey, 2012). Despite this advantage, as pointed out by Helme and Clarke (2001), very few studies have used direct observations of students' behaviours to assess levels of cognitive engagement. Fredricks et al. (2004) also noticed that the observational method was less common as a choice for researchers to measure cognitive engagement. There are several reasons: First, the information obtained via observational methods is highly inferential, especially when assessing the quality of students' mental investments such as effort or thinking (Fredricks et al., 2004; Appleton et al., 2006). Some students observed to be off-task may be highly cognitively engaged in problem-solving. Thus, there are some concerns about the reliability of the observational method since this technique relies heavily on the observers' ability to make accurate observations and their judgments about what should be observed (Turner & Meyer, 2000). Second, observational methods sometimes blur the boundary between cognitive engagement and behavioural engagement measures, although the literature is robust to tell them apart. Finally, observational methods are labour-intensive and usually applicable to a relatively small amount of participants (Fredricks & Mccolskey, 2012).

Interviews

The interview is another method that has been used to measure students' cognitive engagement. Dent and Koenka (2016) pointed out that researchers who viewed cognitive engagement as the use of cognitive and metacognitive strategies often applied structured interviews to obtain information about students' strategy use by asking for further explanations of their prospective or retrospective behaviours. For example, a frequently used structured interview was the Self-Regulated Learning Interview Schedule (SRLIS) developed by Zimmerman and Martinez-Pons (1986), which asked students to describe how they would use self-regulated learning strategies in a hypothetical learning scenario. The study by Helme and Clarke (2001) with students in mathematics classes was another example of using an interview technique to examine students' cognitive engagement levels. To be specific, twenty-four students were interviewed multiple times through the study, resulting in one hundred and nine interviews, which were then analyzed for evidence of cognitive engagement. Beyond the twenty behavioural indicators of cognitive engagement identified from class observations, four additional indicators were discovered from the interview records, such as 'claims to have been engaged during the lesson (e.g., I really put my minds to it)'. The SRL (Self-regulated Learning) microanalysis, which measures cognitive engagement in cyclical SRL processes, is designed to assess students' regulatory behaviours and thoughts in context-specific tasks (Cleary & Zimmerman, 2012). An essential feature of this approach is the use of a structured interview protocol whereby context-specific questions delineated the three-phase model of SRL (i.e., forethought, performance, and self-reflection) in a temporally appropriate sequence. Specifically, forethought phase questions are administrated "before" a task, performance questions "during" the task, and self-reflection questions "after" performance on the task (Cleary & Zimmerman, 2012).

Interviews provide additional information to help researchers interpret the observed actions or self-report results. Besides, interviews allow for the construct of cognitive engagement to be redefined by the participants and for new understandings of theoretical claims to emerge (Turner & Meyer, 2000). However, the interviewing method is not without disadvantages. First of all, the validity of the interview method depends on the degree to which the participants are willing and able to share their ideas. Second, the interviewers' knowledge and skills could affect the type, quality, and depth of participants' responses. A third disadvantage is the problem of social desirability. Students may answer questions in order to 'look good' or please the interviewers (Fredricks & Mccolskey, 2012; Turner & Meyer, 2000).

Teacher ratings

A few studies have used teacher ratings to assess students' cognitive engagement. As an example, Wigfield et al. (2008) developed the Reading Engagement Index (REI) for teachers to rate each student's engagement in a reading task. Specifically, teachers rated students' cognitive engagement on the following three items: (1) works hard in reading (effort), (2) uses comprehension strategies well (strategies), and (3) thinks deeply about the content of texts (conceptual orientation). The rating was based on teachers' perceptions, with 1 = *not true* to 4 = *very true*. Thus, students received a score of 3 to 12 in terms of their levels of cognitive engagement. To avoid overburdening teachers in a study with 340 participants, the Teacher Rating Scale developed by Lee and Reeve (2012) asked teachers to assess each student's cognitive engagement with only one comprehensive item of "this student uses sophisticated learning strategies, is a planful and strategic learner, and monitors, checks, and evaluates work". Teachers made their ratings using a 7-point response scale, with 1 = *strongly disagree* to 7 = *strongly agree.* Fredricks and Mccolskey (2012) pointed out that teacher ratings can be beneficial for studies with younger children since they may have limited comprehension and literacy skills to complete self-report surveys. However, it is vital to notice that teacher ratings have their challenges. A recurring problem is that teachers are aware of students' task performance and their past class-specific abilities. Thus, teachers tend to use both performance-based and ability-based information to inform their inferences of students' cognitive engagement, which could inflate teachers' confidence in ratings (Lee & Reeve, 2012).

Experience sampling

Another technique for assessing student cognitive engagement is the experience sampling method (ESM), which usually involves the use of electronic or digital devices to interrupt students to probe their thoughts and feelings at that moment (Xie et al., 2018). The essential characteristic of ESM is that students' feelings, thoughts, and/or actions are measured regularly as they are experiencing in an authentic context (Zirkel et al.,

2015). In general, researchers who conceptualized engagement from the perspective of flow (i.e., considering engagement as highly dynamic, fluctuating, and interactive) often used this technique to capture students' subjective experiences (Shernoff et al., 2016; Fredricks & Mccolskey, 2012). One example of ESM-based data collection is Salmela-Aro and her team's (2016) study to measure situational engagement with smartphone applications that triggered short questionnaires several times in the science classes. Specifically, students received smartphones with an application that prompted questionnaires and emitted short acoustic signals at fixed time intervals in science lessons. The students were asked to report on the 4-point Likert scale immediately on the application after hearing the signal. Instead of relying merely on fixed sampling, Xie et al. (2018) designed two sampling methods, i.e., fixed and event-based ESM. Students were required to answer mini-surveys for event-based ESM, which contained cognitive engagement items, as they triggered certain study events in a mobile-learning environment.

The ESM is a promising technique to explore an individual's intra-psychological states, such as cognitive engagement, so that the individual is being asked to respond when required in repeated manners (Järvelä et al., 2008). Moreover, ESM is considered a more sensitive method of measuring cognitive engagement than traditional self-report measures since it collects data in the moment of learning or problem-solving. The experience sampling technique, although it provides researchers with an innovative approach to assess cognitive engagement as it occurs in a context, suffers from several limitations. The idea of ESM is to interrupt students regularly at unexpected times, which may disturb their thinking processes or even irritate participants due to its intrusiveness nature. Studies with ESM can also be time-consuming; thus, such research requires a high level of commitment from participants (Zirkel et al., 2015). Moreover, considering participant fatigue, the survey is usually kept short, which may not be suitable for research consisting of a wide range of variables.

Eye-tracking

Researchers have also embraced eye-tracking, a non-intrusive but informative technique, to collect the eyes' positions and movements of students to infer their cognitive engagement (Antonietti, Colombo, & Nuzzo, 2015; D'Mello et al., 2017; Miller, 2015). Using eye-tracking to measure engagement is based on three foundational assumptions: (1) The baseline of engagement is the simple act of paying attention, while eye-tracking can identify this act by measuring if students' eyes have rested on an object for a minimum amount of time. This assumption is based on that students cannot be even minimally cognitively engaged in a task if they are not paying attention to the stimulus. (2) Secondly, the eye-mind-engagement assumption asserts that fixation duration (i.e., the length of time an eye is still for extracting information from a particular stimulus) reflects the quantity and quality of one's cognitive effort; and (3) Increase in pupil size associates with an individual's increased cognitive effort once the external factors (e.g., the brightness of objects) are controlled (Miller, 2015).

Benefits of using the eye-tracking technique to assess cognitive engagement include real-time analysis of eye movement data, a precise indication of visual attention distribution, and availability of a rich quantified dataset for establishing user models (Kruger, Hefer, & Matthew, 2014; van Gog & Jarodzka, 2013). However, as pointed out by Miller (2015), more research is still needed to develop mature procedures for collecting eye movements and pioneer methodological techniques for extracting reliable engagement-related information. For one, multiple eye movement indices were recommended to advance a more precise measurement of engagement, but meanwhile, it also made interpretation more difficult (Miller, 2015).

Physiological measures

Most of the physiological methods aim to measure electrical signals produced in the skin (Electrodermal activity, EDA), brain (Electroencephalograph, EEG), or muscles (electromyogram, EMG), and to provide researchers physiological data to make inferences about participants' emotional and cognitive states (D'Mello et al., 2017; Stevens, Galloway, & Berka, 2007). Since the physiological methods provide rich data sources in fine-grained size, there has been a surge in using these techniques to measure engagement. To step further, EDA and EMG are usually used to measure emotional engagement, and EEG is used to measure cognitive engagement (Charland et al., 2015; Schuurink, Houtkamp, & Toet, 2008).

EEG is an electrophysiological monitoring technique that measures electrical activities of the brain, with the electrodes attached to different locations on the scalp (Berka et al., 2007). Researchers commonly analyze the power spectral density (PSD) of specific frequency spectrums of electrical signals to quantify cognitive engagement during a task (Charland et al., 2015). The analysis of PSD can be done with various EEG systems. For example, Kruger, Hefer, and Matthew (2014) used an Emotiv™ Neuro-headset EEG to record 68 students' brain activities while watching a recorded lecture. Precisely, the EEG was placed on students' heads as they were seated comfortably on a stable chair. Once accurate recordings were confirmed and the baselines for analyzing various EEG channels were identified, students were instructed to watch a video recording of a Psychology lecture, during which the information of their brain activities was collected. Based on the raw EEG data, engagement as one of the five categorized EEG channels was generated by the Emotiv™ software. In Stevens et al.'s (2007) study, a wireless EEG sensor headset was used to record 12 participants' electrical signals generated from their brains during scientific problem-solving. Data sampling speed was at 256 samples per second, based on which the engagement index, ranging from 0.1 to 1.0, was calculated for each 1-second epoch for each student via the B-Alert software.

The advantages of using EEG to measure engagement include the ability to monitor levels of engagement continuously, unobtrusiveness, and being a fine-grained measure. However, several challenges remain in this area of measurement. For a practical one, EEG-based research can be labor-intensive and expensive for both researchers and participants. Another important consideration is that EEG devices and software operation can usually be very complicated, requiring researchers to accumulate sufficient skills and experiences. Besides, the engagement-related indices generated from EEG systems are not always accurate, especially considering individual differences and contextual factors (Stevens et al., 2007).

Log files

Researchers who conceptualized cognitive engagement from the depth of processing and self-regulation theories are increasingly using log files to assess cognitive engagement, since log files provide a wealth of information about the timing, occurrence, frequency, and pattern of learning activities as students engage in computer-based learning environments (CBLEs) for learning and problem-solving (Greene, 2015; Bernacki et al., 2012). Log files can be comprehensive if researchers pinpoint the types of learning events meaningfully associated with students' cognitive engagement. Moreover, log files provide new opportunities for understanding the dynamic nature of cognitive engagement since students' digital footprints during the interaction with CBLEs are recorded automatically and unremittingly. In general, cognitive engagement is assessed by extracting students' cognitive and metacognitive strategies from logs of learners' behaviours (Bernacki et al., 2012; Chen & Pedersen, 2012). Meanwhile, log files have also been used in other ways to infer levels of cognitive engagement. For example, many studies have operationalized the construct of cognitive engagement in terms of time-on-task (Helme & Clarke, 2001; Järvelä et al., 2008). In a recent study, Li, Zheng, Poitras, and Lajoie (2018) analyzed log file data to identify patterns in the allocation of cognitive resources of 62 medical students in solving patient cases. Findings from their research demonstrated that students' cognitive engagement, which was assessed by students' on-task time, varied across and within problem-solving phases (i.e., forethought, performance, and reflection).

Language and content analyses

Cognitive engagement is inherently unobservable and hard to measure. Thus researchers have explored another method, language and content analysis, to detect this construct from students' use of verbal languages or written materials, since language is the most reliable way for individuals to translate their internal thoughts into a form that others can understand (Tausczik & Pennebaker, 2010; Ireland & Henderson, 2014). At its simplest, word count reflects how engaged students are in a conversation or activity (Tausczik & Pennebaker, 2010). Researchers have also made a few attempts to extract language features from verbal or written materials to infer levels of cognitive engagement using a variety of text mining techniques. For example, a computerized text analysis program of Linguistic Inquiry and Word Count (LIWC) has been used in a wide range of experimental settings to study various forms of engagement by comparing students' written samples with its psychologically meaningful categories (Pennebaker, Boyd, Jordan, & Blackburn, 2015; Tausczik & Pennebaker, 2010).

Rather than using systematic, strict textual analysis, researchers have also used content analysis in a more

qualitative, interpretive way to make inferences about students' cognitive engagement. For example, Zhu (2006) developed the Analytical Framework for Cognitive Engagement in Discussion to code students' levels of cognitive engagement based on collected discussion messages as students participated in asynchronous online discussions. While this qualitative approach of content analysis can address some of the issues that existed in textual analysis, the biggest challenge is that considerable effort should be made to reach objectivity in rating levels of cognitive engagement and solve discrepancies among raters.

All in all, there are various promising instruments and methods to measure cognitive engagement, and each type of measure has strengths and weaknesses. Based on the literature reviewed previously, we have identified some guidelines for future research and practice to measure cognitive engagement.

4. Conclusion, Discussion and Recommendations

To improve the measurement of cognitive engagement, one of the first steps for researchers is to describe the construct of cognitive engagement more clearly, given the variations in its definitions (Fredricks et al., 2011; Miller, 2015; Samuelsen, 2012). On the one hand, the many conceptualizations of cognitive engagement make it into a broad umbrella term covering a wide range of concepts and ideas. Researchers need to be aware of their preferences of a particular definition of cognitive engagement and the theories underlying that definition, otherwise constructs other than cognitive engagement would be included to mess up the measurement (Greene, 2015). For example, Sinatra et al. (2015) pointed out that the operational definition of cognitive engagement sometimes has much in common with existing motivation constructs. On the other hand, cognitive engagement has been conceptualized at different levels, such as an individual's cognitive engagement in tasks and a group of students' cognitive engagement in school. Thus, it is recommended that the nature of the research context (e.g., school, classroom or a specific task) and one's research goals (e.g., basic research or school policy) should be kept in mind (Azevedo, 2015), since they determine the grain-size of measurement of cognitive engagement and corresponding instruments.

Moreover, it has been reminded by some researchers that large-scale engagement surveys should be used cautiously, since they are usually developed for non-academic purposes. The large-scale surveys present little evidence of their validity (Veiga et al., 2014). For example, the High School Survey of Student Engagement (HSSSE) is administered every year to collect information about students' views of school learning environment, schoolwork, and interactions with the school community, with an attempt to assist schools in recognizing areas for improvement (Fredricks & Mccolskey, 2012). The National Survey of Students Engagement (NSSE), another large-scale instrument initiated every two years, has elicited considerable criticism from the engagement research community for lacking validity (Veiga et al., 2014; Fredricks et al., 2011). Consequently, researchers who use subscales or sets of items adapted from a larger instrument need to pay particular attention to the instruments' reliability and validity. Otherwise, the construct of cognitive engagement would be measured differently from what it is supposed to (Fredricks et al., 2011).

Another necessity in advancing the measurement of cognitive engagement is to distinguish indicators of cognitive engagement from its antecedents and facilitators (e.g., willingness, interest, self-efficacy) and its direct or indirect outcomes, such as procrastination, grade, and task performance (Veiga et al., 2014). Take the Student School Engagement Survey (SSES) as an example. Items like 'Most of my teachers know the subject matter well' and 'I get good grades in school' were included to capture students' cognitive engagement. However, the prior item relates to teachers' competency in teaching, and the latter one associates with students' academic performance, which are the antecedent and outcome of cognitive engagement, respectively.

In addition, more advanced statistical techniques are needed to differentiate the salient indicators of cognitive engagement from the trivial ones and to exclude the repetitive elements since a variety of indicators for measuring cognitive engagement have been proposed. For instance, to what extent do students' experiences of flow (i.e., an indicator of cognitive engagement in the SCEM) relate to the indicator of absorption as measured in UWES-S? The same with instrument items. Betts (2012) suggested that statistical modelling techniques, especially confirmatory factor analysis and item response theory, should be considered in constructing and evaluating cognitive engagement measures. Samuelsen (2012) also argued that statistical methods, such as differential item functioning, could address some of the measurement issues. Lastly, researchers are increasingly calling for the use of multiple methods to measure cognitive engagement rather than relying merely on a single method (Greene, 2015; Sinatra et al., 2015; Betts, 2012). First, researchers may

overcome some limitations of using only one approach by adopting multiple methods (Azevedo, 2015). For example, using self-reports along with the experience sampling method (ESM), researchers may gain a more nuanced understanding of students' cognitive engagement since students would be more sensitive to survey questions as they are still in the proximity of time and space in the context of problem-solving (Xie et al., 2018; Zirkel et al., 2015). Moreover, multimethod might reveal more components or manifestations of cognitive engagement than a single method. For instance, Helme and Clarke (2001) used both observation and interview techniques to examine students' cognitive engagement levels, whereby twenty indicators of cognitive engagement were identified from observations, and four additional indicators were discovered from the interview records. Furthermore, the combination of different approaches to measuring cognitive engagement allows researchers to triangulate and therefore establish the validity of the data, which is a robust way to study how cognitive engagement changes over time (Greene, 2015). While keeping the strengths of multimethod for measuring cognitive engagement in mind, it is vital to notice that construct definition drives the choice of measures rather than the opposite, considering that different methodologies often imply different theoretical orientations of cognitive engagement (Sinatra et al., 2015). Thus, a clear definition of cognitive engagement should be provided before the selection of measurements.

Taken together, this paper adopts an analytical perspective to review contemporary measurement methods of cognitive engagement used in broader academic settings. In doing so, no prospective method is omitted, and many possibilities are offered to researchers when exploring how cognitive engagement unfolds within and across learning phases. In addition, this review is particularly useful to practitioners in exploiting the affordances and minimizing the constraints of different cognitive engagement measures. Moving forward, we propose that a multimethod approach to capturing cognitive engagement is a necessity for future empirical work. Analyzing multimodal data about cognitive engagement may open new scientific leads to come closer to the essence of this construct, and this study paved the way for fulfilling this goal.

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Metaphorical Perceptions of Preservice Social Studies Teachers About the Communication Skills

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ARTICLE INFO	ABSTRACT
	The study aimed to determine the perceptions of preservice social studies teachers about communication; metaphors were employed to determine communication skill perceptions. In the study, a qualitative research method known as phenomenology design was employed. The study group included 127 preservice social studies teachers in various classes. In the study, metaphoric perceptions form was used to collect the data. The collected data were analysed with content analysis. The study findings demonstrated that preservice social studies teachers produced 36 valid metaphors in 7 different conceptual categories (a requirement, a nonverbal code system, a mutual process, a positive connotation, a unifying element, a dynamic phenomenon, communication as a method to reflect ideas). The total metaphor count and metaphor frequencies revealed that the highest number of metaphors was produced in the communications as a requirement category. The most repeated metaphor in this category was the requirement of water to sustain life. In this category, concepts such as blood, breathing, and oxygen, which are important for human life, were expressed as metaphors that represented communication skills.

1. Introduction

It could be suggested that the concept of communication is as old as the history of humankind. Individuals have been communicating with each other in one form or another since their existence. Various signs and sounds are among the first known forms of primitive communication. The first formal and distant forms of communication included the drawings on cave walls and stones. Later, around 4000 BC, written and verbal communication developed with the introduction of languages. The concept of 'information society' became prominent in the 20th century, especially due to rapid advances in communication technologies (Aziz, 2016). Individuals who possess knowledge could transfer this knowledge to their daily lives (Akbaba & Aksoy, 2019).

Communication refers to a process rather than a phenomenon with a beginning and an end. The party that initiates the communication process is the source that sends the message to the recipient (Işık, 2018). Signs that focus on the aim are required for communication to occur (Argyle, 1988). Their communication achievements distinguish humankind from other living beings, and they owe their superiority to that fact. Communication is an important tool for individuals to expand their social environment. Individuals must communicate with their environment, and this obligation led to individuals continuously sending messages to people around them (Orta, 2009; Aziz & Dicle, 2017).

Interpersonal communication is based on interaction. Interaction occurs when a message is sent in a one-on-one feedback loop (Castells, 2009). Interpersonal communications constitute social life, and communication is

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a significant requirement in social development (Bolat, 1996). The social communication phenomenon includes mass media and mass media tools (Yılmaz, 2003). Today, the concept of communication has different definitions in different professions, disciplines, and fields of study. Communication emerged to unite the human mind and abilities to meet human needs (Orta, 2009).

Communication processes include various elements that are expressed with different names. For example, Işık (2019) reported that the communication process includes six basic elements. These basic elements are; source, code, channel, message, target audience, and feedback. The source transmits the message to the receiver (target audience) using codes and various channels in basic communication processes. Following the response of the target audience, the source becomes the receiver. Bolat (1996), on the other hand, described the basic elements of communication as a simple communication model in 4 elements: sender, message, receiver, and channel. The communication model is presented in Figure 1 below.
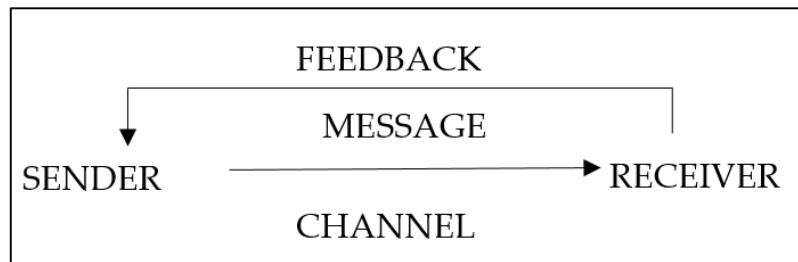
Figure 1. *The Basic Communication Model*

Education and instruction activities conducted in schools are communication activities. Communications among the instructor and the student and the administrator and other staff have an important effect on conducting adequate and healthy activities. Therefore, communication barriers should be determined and eliminated to establish healthy communications in a school environment (Bolat, 1996).

Although an individual is susceptible to communication when born, communication skills do not emerge or develop automatically. Human interaction with the environment and a healthy communication environment affect the development of communication skills (Deniz, 2003). School is one of the places where people interact with those around them, making classroom or in-school learning a type of communication. Therefore, communication with students is essential, especially for educational activities to achieve their goals. In communication with students, many issues should be considered (Açıkalın & Turan, 2020):

- It should not be forgotten that each student has a unique world.

- The teacher should pay attention to their personal behaviour and attitudes.

- Criteria such as eye contact, facial expression, and tone of voice should be considered.

- Students should be encouraged, listened to, and understood.

- All kinds of fears and concerns should be eliminated.

Teacher competencies are important in paying attention to these issues in communication with students. It can be said that the content, acquisition, and objectives of teacher training programs effectively acquire these competencies. Communication, which is required in the vast majority of educational processes, has also been included as a skill in curricula in different educational areas. One of these fields is social studies.

Since social studies have an interdisciplinary approach, it is a discipline that enables to look at a subject from a different perspective (Çetin, Kılcan, Güneş, & Çepni, 2015). In this sense, it aims to gain some skills in the target group. One of the skills instructed in social studies is communication skills. Communication as a skill is based on goals, skills, achievements, and activities in the social studies curriculum (MoNE [Ministry of National Education], 2005; MoNE, 2018). Thus, the aim was to acquire basic communication skills from the target audience and conscious utilisation of the communication technologies (Kılıçoğlu, 2019). Social studies and preservice teachers should develop communication skills. Especially preservice social studies teachers should comprehensively perceive the communication skills content.

Metaphor means "transfer" and "transport". The term metaphor includes literary concepts such as analogy and simile (Pollard, 2003). Metaphors are commonly used in language, thoughts, and behaviours in daily life

(Lakoff & Johnson, 2010). Metaphors could be used to express a single idea or long-term experiences. Metaphors provide rich imagery about the described content. Metaphors store valuable information and allow the information to become non-mediocre and original (Tompkins & Lawley, 2002). Metaphors can be used to understand and discover abstract, theoretical or new phenomena (Yob, 2003). They reflect incomplete or implied messages rather than communicating a message clearly (Tsai, Lo, & Tseng, 2017). Metaphors could sometimes lead to expressions that could be considered inaccurate (Caspi, 2018). Thus, it is important to examine the rationale behind the metaphors in detail.

Metaphors are frequently used in various fields, as well as the different areas in education. Metaphors play a role in developing models and theories tackled in various educational institutions such as schools and colleges (Botha, 2009). Therefore, models and theories can be shaped by examining the perceptions of various target audiences towards the concepts, skills, and values used in educational processes through the metaphors they produce. Metaphor studies conducted on concepts such as social sciences, such as history (Candan & Öztaş, 2017; Er Tuna & Mazman-Budak, 2013; Kantekin, 2018), geography (Aydın, 2010; Çepni, 2013; Durmuş & Baş, 2016; Gökçe, 2016; Kantekin, 2018; Öztürk, 2007; Şahin & Kaya, 2016), social studies/course/teacher (Akça Berk, Gültekin, & Çençen, 2015; Akhan, Kılıçoğlu, & Gedik, 2014; Beldağ & Geçit, 2016; Çelikkaya & Yakar, 2015; Güven & Güven, 2009; Kantekin, 2018; Kuru & Pırnaz, 2020) and some values (Aktepe, Uzunöz, & Sarıçam, 2020; Çelikkaya & Seyhan, 2017; Demirkaya & Çal, 2018; Gömleksiz, Kan, & Öner, 2012; İnel, Urhan, & Ünal, 2018; Kılcan & Akbaba, 2013; Kılcan & Akbaba, 2014; Seyhan, 2020; Ulu Kalın & Koçoğlu, 2017; Uzunöz, Aktepe, & Özağaçhanlı, 2020) within the scope of social studies are important in terms of revealing how the nature of social studies is perceived by different target groups. Additionally, determining the perceptions about the skills in social studies through metaphors will also contribute to the evaluation of social studies in terms of skills.

When the literature is examined, it is seen that metaphorical perception studies (Ablak & Aksoy, 2018; Uymaz & Çalışkan, 2018; Seyhan, 2014) on the 2005 & 2018 social studies curriculum skills (MoNE, 2005; MoNE, 2018), and studies (Kaya, Çiftçi, & Gökdemir, 2019; Uygun & Arıkan, 2019; Uygun & Arıbaş, 2020) focusing on the communication skills of preservice social studies teachers, use data collection tools such as scale and inventory. Furthermore, there are studies in the literature that examine the perceptions of preservice teachers (Epçaçan, 2016), university students (Koç Akran, Acıdemir, & Uludağ, 2018), and preservice classroom teachers (Semercioğlu & Akçay, 2020) towards communication through metaphors. Therefore, it is thought that this study will contribute to the literature, especially in terms of focusing on preservice social studies teachers' metaphors towards communication.

The fact that communication is a skill that the target audience should acquire in the social studies curriculums (2005 and 2018) and that communication is one of the important competencies of the teaching profession made it necessary to reveal how preservice social studies teachers perceive this skill. The results from such studies are important in guiding different course contents or process designs regarding how to teach preservice teachers communication skills.

The study's main purpose is to determine the perceptions of preservice social studies teachers for communication skills through the metaphors they produce. In line with this main purpose, the following questions were sought:

- What are the metaphors produced by preservice social studies teachers on communication skills?
- In which conceptual categories could the metaphors produced by preservice social studies teachers on communication skills could be grouped?

2. Method

2.1. Research Model

In the present qualitative study, the phenomenology design was employed. Phenomenology focuses on uncovering possible meanings of situations and experiences (Annells, 2006). Communication is an important experience for people; thus, the perceptions of preservice social studies teachers on communication skills were investigated in depth based on metaphors.

2.2. Research Sample

The research sample was determined using the easily accessible sampling method, one of the non-probabilistic sampling methods. In easily accessible sampling, the researcher includes sampling that can be easily reached due to lack of time or opportunity (Özdemir, Şahin Tekin, & Esin, 2019). This sampling method was used due to the Covid-19 outbreak in Turkey. The study group included 127 preservice teachers attending Artvin Çoruh University, Faculty of Education, Department of Social Studies Instruction during the 2019-2020 academic year. Participant demographics are presented in Table 1 below.

Table 1. *Characteristics of the Research Sample*

	Grade				Total	
	1st Grade	2nd Grade	3rd Grade	4th Grade		
Gender	n	n	n	n	n	%
Female	21	28	14	23	86	67.7
Male	8	10	9	14	41	32.3
Total	29	38	23	37	127	100

The study group included 127 volunteering first-year, sophomore, junior, and senior preservice social studies teachers, out of which 86 were female (67.7%) and 41 were male (32.3%).

2.3. Data Collection Tool

Before the data collection tool was developed, the literature (Epçaçan, 2016; Güven & Güven, 2009; Koç Akran, Acıdemir, & Uludağ, 2018; Saban, 2004; Saban, 2008) was examined. The study data were collected with the "*Metaphoric Communication Perceptions Form*". The form included questions that aimed to determine student demographics such as gender and seniority and a fill in the blanks question: "Communication is like ………, because …….". Furthermore, producing metaphors was explained with an example for the participants who may not know the concept of metaphor. The data collected with the data collection tool was the primary data source in the present study.

2.4. Data Analysis

The data were analysed, in detail, with content analysis based on the metaphor categories and the rationale behind them, as identified by the participants. The analysis was conducted in 5 steps (Saban, 2008; Yıldırım & Şimşek, 2006).

2.4.1. Denomination

Metaphors obtained from the participants were listed, and the frequency of the reoccurring metaphors was determined. The metaphors and their rationale were analysed in detail, and their correlations with communication skills were determined.

2.4.2. Elimination-Refinement

The analysis of the metaphors produced by preservice social studies teachers revealed that not all metaphors were associated with communication skills. Thus, all metaphors and justifications were analysed and classified based on the following criteria:

- The correlation between the source and topic of the metaphor,

- The solid rationale behind the metaphor,

- Production of poor metaphors (explaining a metaphor with reasons that could be considered in several categories).

Thus, the data sources that did not produce metaphors about communication skills but included explanations ("If there is no communication, the world has no meaning", "It allows us to convey our feelings and ideas", "It is the best way of expressing one's self", "Life without communication could not exist") were excluded.

A total of 26 data sources that did not include metaphors or included unrelated metaphors were excluded from the analysis. Thus, 36 valid metaphors were obtained from a total of 101 data sources. The data sources were coded as shown in Figure 2 below.
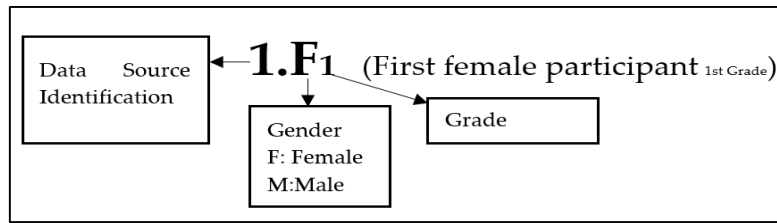
Figure 2. *Data Source Coding*

2.4.3. Categorisation

Metaphors and their justifications in valid data sources were analysed in detail. Certain conceptual categories were developed by grouping valid metaphors with similar concepts.

2.4.4. Validity and Reliability

Expert (social studies educator and language specialist) opinions were obtained to ensure the reliability of the study. The 36 metaphors and 7 conceptual categories developed by the authors were presented to the experts. Then, the categorisations conducted by the experts and the authors were compared. The final inter-coder agreement was determined with the Miles and Huberman (1994) reliability formula (Reliability = Agreement / Agreement + Disagreement). In qualitative studies, an intercoder reliability rate of 90% or more is considered acceptable (Saban, 2008). Thus, the present study reliability was calculated as 92% (Reliability = 36 / (36 + 3)).

2.4.5. Transfer of Data to Computer Environment

Percentages and frequencies of valid metaphors were determined and tabulated in the present study. Then, separate tables were developed for each conceptual category, and the frequency of each metaphor was presented and interpreted in these tables. Finally, data samples of metaphor justification statements for the categories are provided.

2.5. Ethical

Before the research was carried out, permission was obtained from the Scientific Research and Publication Ethics Board of Artvin Çoruh University Rectorate (Date: 08.05.2020, Number of Sessions: 2020/7).

3. Findings

The valid metaphors obtained in the study were arranged in alphabetical order, and frequencies and percentages were calculated. The results of the analysis conducted on the distribution of valid metaphors are presented in Table 2 below.

Table 2. *The Distribution of Valid Metaphors Produced by Preservice Social Studies Teachers on the Concept of "Communication"*

Metaphor	f	%	Metaphor	f	%	Metaphor	f	%
1. Agreement	3	2.97	13. Drug	2	1.98	25. Phone	1	.99
2. Air	1	.99	14. Exchange	4	3.96	26. Picture	1	.99
3. Barter	2	1.98	15. Flower	2	1.98	27. Power grid	1	.99
4. Bird	2	1.98	16. Food	4	3.96	28. Rainbow	2	1.98
5. Blood	3	2.97	17. Foundation of the building	3	2.98	29. Road	2	1.98
6. Bond	3	2.97	18. Fuel	1	.99	30. Sun	1	.99
7. Book	3	2.97	19. Life	7	6.93	31. Tranquillity	2	1.98
8. Breathing	3	2.97	20. Love	5	4.95	32. Tree	1	.99
9. Bridge	3	2.97	21. Mirror	3	2.97	33. Water	19	18.82
10. Colours	1	.99	22. Oxygen	5	4.95	34. Wearing clothes	1	.99
11. Commerce	2	1.98	23. Painting	1	.99	35. Vehicle	1	.99
12. Dove	2	1.98	24. Pencil	1	.99	36. Virus	3	2.97
						Total	101	100

The review of Table 2 demonstrated that the participants produced 36 valid metaphors about communication skills. The most frequent metaphor on communication skills was the water metaphor (f = 19, 18.82%). This was

followed by life (f = 7, 6.93%), oxygen (f = 5, 4.95%), love (f = 5, 4.95%), exchange (f = 4, 3.96%), and food (f = 4, 3.96%). Furthermore, agreement, mirror, bond, building foundation, blood, book, bridge, breathing, and virus metaphors were mentioned by three participants. In contrast, flower, rainbow, dove, tranquillity, drug, bird, barter, commerce, and road metaphors were mentioned by two participants. A total of 12 metaphors, namely tree, vehicle, power grid, sun, air, pencil, wearing clothes, colours, picture, painting, phone, and fuel, were mentioned by one participant.

Thirty-six valid metaphors developed by the participants were discussed in 7 categories. In Figure 1 below, the distribution of the metaphors developed by the participants is presented based on the categories.
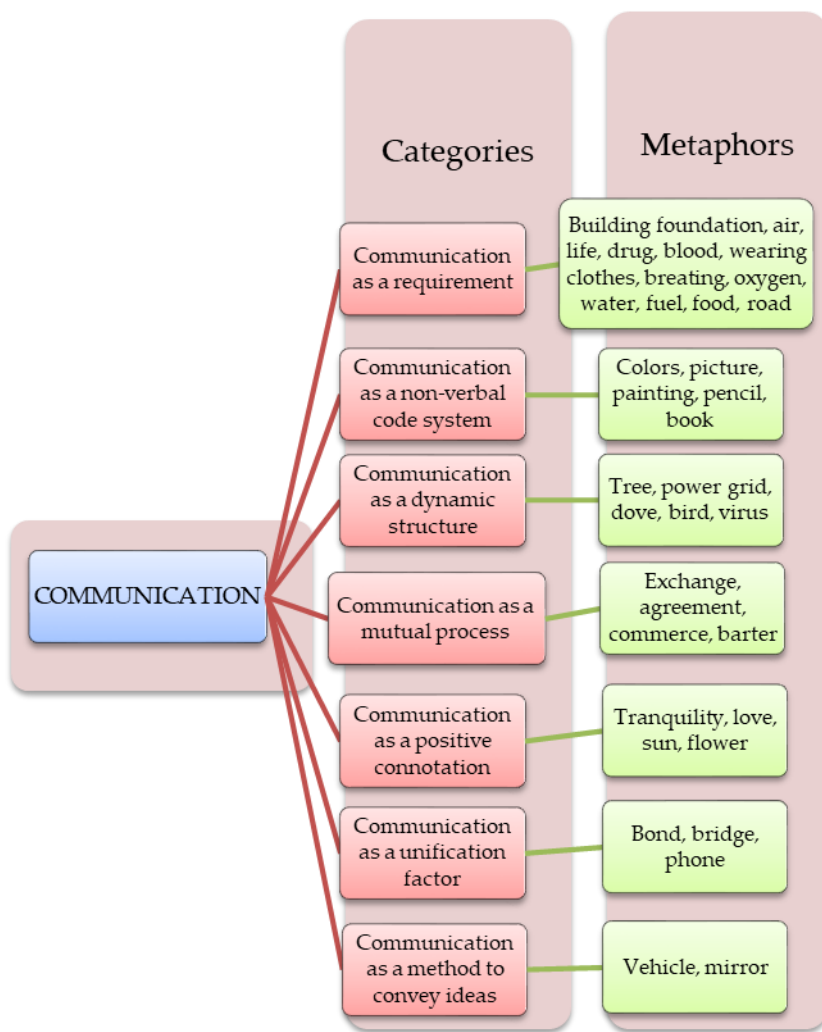
Figure 3. *The Distribution of The Metaphors Based on Categories*

Figure 3 demonstrates that 'communication as a requirement' included building foundation, air, life, blood, wearing clothes, breathing, water, fuel, food, and road metaphors; 'communication as a non-verbal code system' included colours, picture, painting, pencil, and book metaphors; 'communication as a dynamic structure' included tree, power grid, dove, bird, and virus metaphors; 'communication as a mutual process' included exchange, agreement, commerce, and barter metaphors; 'communication as a positive connotation' included peace, love, sun, and flower metaphors; 'communication as a unifying factor' included bond, bridge, and phone metaphors, and 'communication as a way of reflecting ideas' included vehicle and mirror metaphors.

In Figure 4 below, the total number of metaphors and data sources in each category are presented.
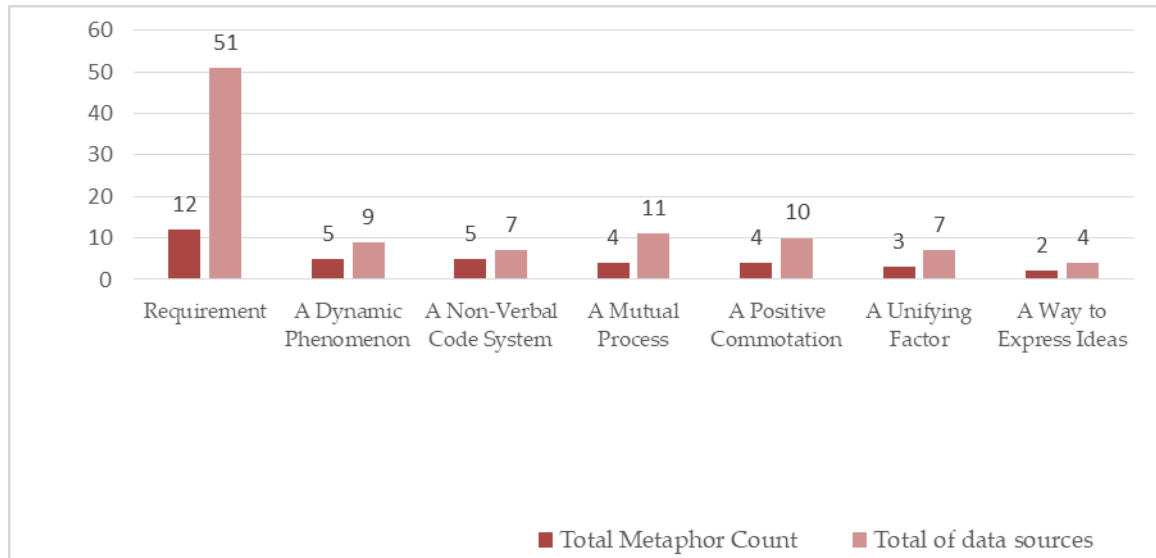
Figure 4. *The Quantitative Distribution of Metaphors and Data Sources Based on Categories*

The review of Figure 4 demonstrated that the highest number of metaphors and data sources were in the category 'communication as a requirement' (Total metaphors (f) = 12, Total data sources (f) = 51). Conversely, the category with the least number of metaphors and data sources (number of participants) was 'communication as a way of expressing ideas' (Total metaphors (f) = 2, Total data sources (f) = 4).

Conceptual Categories

The metaphors produced by the participants on communication skills were analysed in detail based on the categories. In this section, the categories and the metaphors in each category and their frequencies are reported. Furthermore, examples of the participants' metaphor justifications are presented for each category.

Communication as a requirement

The first category developed was 'communication as a requirement'. Table 3 below presents the findings of the metaphors in this category.

Table 3. *Findings in the Communication as a Requirement Category*

Category	Total of Metaphors	Metaphor	Metaphor Frequency (f)
		The foundation of the building	3
		Air	1
		Life	7
		Drug	2
		Blood	3
Communication as a requirement	12	Wearing clothes	1
		Breathing	3
		Oxygen	5
		Water	19
		Fuel	1
		Food	4
		Road	2
		Total	51

The analysis revealed that the most frequently mentioned communication skill metaphor was water (f = 19), followed by life (f = 7), oxygen (f = 5), food (f = 4), foundation of the building (f = 3), blood (f = 3), breathing (f = 3), drug (f = 2), and road (f = 2). Air, clothing, and fuel were produced by a single participant. There were 12 metaphors in this category. The examples of the justifications for the water metaphor, which was the most frequent metaphor, are presented below:

"Communication is like water because there is no life without it." (16.F₃)

"Communication is like water because it is necessary." (13.F₃)

"Communication is like water because it is indispensable. We cannot stay alive without it, we cannot live without communication." (61.M₁)

"Communication is like water because we cannot live without communication, like water. Our needs and desires would not be met." (10.F₂)

"Communication is like water because both are indispensable for human life." (60.F₂)

The justifications for the other metaphors are presented below:

"Communication is like the foundation of a building because the foundation keeps the building erect and communication keeps the humanity erect." (92.M₃)

"Communication is like life because one cannot really live without communications; humans are social beings." (87.F3)

"Communication is like life because there is no life without communication." (85.F2)

"Communication is like blood because it is similar to the liquid of life." (30.F1)

"Communication is like wearing clothes because humans need to communicate with another in every moment of life." (80.M2)

"Communication is like breathing, because when both end, life ends as well." (24.M1)

"Communication is like oxygen because one cannot breathe without it." (72.F1)

"Communication is like eating because it is required as much." (53.F4)

"Communication is like eating because we cannot exist for a long time without it." (52.M1)

Communication as a dynamic phenomenon

The communication as a dynamic phenomenon category was created because participants considered communication skills as a dynamic phenomenon in the metaphors and the rationale behind these metaphors. The frequencies of the metaphors are presented in Table 4 below.

Table 4. *Findings of the Communication as a Dynamic Phenomenon Category*

Category	Total of Metaphors	Metaphor	Metaphor Frequency (f)
Communication as a dynamic phenomenon	5	Tree	1
		Power grid	1
		Dove	2
		Bird	2
		Virus	3
		Total	9

The review of Table 4 demonstrated that the most frequent metaphor in the communication as a dynamic phenomenon category was 'virus' (f = 3). Furthermore, dove (f = 2), bird (f = 2), tree (f = 1), and power grid (f = 1) were also mentioned. A total of 5 metaphors were included in the category. The examples of the justifications mentioned by the participants are presented below:

"Communication is like life because its branches and roots reach everywhere. Communication reaches everywhere as well." (101.M₃)

"Communication is like a power grid because everywhere could be reached." (91.M₄)

"In my opinion, communication is like a dove, because when we communicate, we can express our views freely like a dove." (89.F₁)

"Communication is like a bird because you can reach anywhere whenever you wish." (76.M₁)

"Communication is like a virus because it spreads rapidly." (5.M₁)

"Communication is like a virus because it affects people." (4.F₄)

Communication as a non-verbal code system

Another category determined was the 'communication as a non-verbal code system' category. In Table 5 below, findings on this category are presented.

Table 5. *Findings in the Communication as a Non-Verbal Code System Category*

Category	Total of Metaphors	Metaphor	Metaphor Frequency (f)
Communication as a non-verbal code system	5	Pencil	1
		Book	3
		Colours	1
		Picture	1
		Painting	1
		Total	7

As seen in Table 5, 5 metaphors developed by the participants were included in the category. The most frequent metaphor was 'book' (f = 3). The examples of the justifications mentioned by the participants are presented below:

> *"Communication is like a pencil because it is more than an object that you need to express your emotions."* (82.F4)

> *"Communication is like a book because it contains numerous emotions."* (79.F2)

> *"Communication is like the colours because it reflects the emotions you wish to express like the meanings of different colours."* (21.F4)

> *"Communication is like a painting because it makes a different sense every time you look at it."* (8.F2)

Communication as a mutual process

In Table 6 below, findings on communication as a mutual process category are presented.

Table 6. *Findings in the Communication as a Mutual Process Category*

Category	Total of Metaphors	Metaphor	Metaphor Frequency (f)
Communication as a mutual process	4	Exchange	4
		Agreement	3
		Commerce	2
		Barter	2
		Total	11

This category included metaphors such as exchange, agreement, commerce, and barter. The most frequent metaphor was 'exchange' (f = 4). A total of 4 metaphors were included in this category. The examples of the justifications mentioned by the participants are presented below:

> *"Exchange occurs between at least two people."* (100.F2)

> *"Communication is like an agreement, the articles of which depend on the parties, because all the words we say, all our behaviour, even a small gesture reflect approval or rejection. In this agreement, every conflict or consensus is just a matter of time."* (47.F3)

> *"Communication is like barter because it is mutual."* (58.F4)

> *"Communication is like commerce because both are mutual."* (6.F2)

Communication as a positive connotation

It was determined that the participants had positive perspectives towards communication skills in certain metaphors and justifications presented for these metaphors. The findings on this category are presented in Table 7 below.

Table 7. *The Findings on the Communication as a Positive Connotation Category*

Category	Total of Metaphors	Metaphor	Metaphor Frequency (f)
Communication as a positive connotation	4	Flower	2
		Sun	1
		Tranquillity	2
		Love	5
		Total	10

As seen in Table 7, there were 4 metaphors in this category. The most frequently mentioned metaphor was 'love' (f = 5). This was followed by flower (f = 2), tranquillity (f = 2), and sun (f = 1). The examples of the justifications mentioned by the participants are presented below:

"Communication is like a flower because it becomes more beautiful when you take care of it." (41.F₁)

"Communication is like a sun because we are enlightened when we communicate." (39.F₃)

"Communication is like tranquillity because when we talk, we can solve many problems and we feel better." (84.M₂)

"Communication is like love; it multiplies when shared." (20.M₄)

Communication as a unifying factor

Another category determined was 'communication as a unifying factor'. The findings on the metaphors in the category are presented in Table 8 below.

Table 8. *The Findings on the Communication as a Unifying Factor Category*

Category	Total of Metaphors	Metaphor	Metaphor Frequency (f)
		Bond	3
Communication as a unifying factor	3	Bridge	3
		Phone	1
		Total	7

The review of Table 8 demonstrated that the category included the metaphors bond, bridge, and phone. Among the metaphors in this category, the most frequently mentioned ones were bond (f = 3) and bridge (f = 3). The examples of the justifications mentioned by the participants are presented below:

"Communication is like a bond because the dialogue formed by two or more people binds people to each other." (94.M₂)

"Communication is like a bridge because it connects the two banks and allows people to reach their destination." (77.F₄)

"Communication is like a phone because it connects us with the world." (57.M₃)

Communication as a way to express ideas

The last category developed to classify the metaphors produced by the participants about communication skills was the 'communication as a way to express ideas' category. The findings on the category are presented in Table 9 below.

Table 9. *The Findings on the Communication as a Way to Express Ideas Category*

Category	Total of Metaphors	Metaphor	Metaphor Frequency (f)
		Vehicle	1
Communication as a way to express ideas	2	Mirror	3
		Total	4

The review of the metaphors in the category demonstrated that the most frequently mentioned metaphor was 'mirror' (f = 3). There were 2 metaphors in this category. The examples of justifications for the vehicle and mirror metaphors are presented below:

"Communication is like a vehicle because it allows us to transport and reveal our ideas." (97.M₄)

"Communication is like a mirror. It reflects our inside to the outside." (96.F₄)

"Communication is like a mirror because it allows us to face ourselves and communicate with the emotions." (45.F₂)

4. Conclusion and Discussion

Certain conclusions were extrapolated based on the findings obtained by analysing the metaphors and justifications of the participants on communication skills. Krippendorff (1993) classified communication with the metaphors 'container', 'channel', 'control', 'transfer', and 'dance ceremony'. Epçaçan (2016) expressed participants' metaphors regarding communication in seven categories; nature, love, connection, basic needs, tools, and technology, due to his study on preservice teachers. In the present study, communication metaphors

were categorised as a requirement, a non-verbal code system, a mutual process, a positive connotation, a unifying factor, a dynamic phenomenon, and a way to express ideas. It can be said that the categories created for the data obtained in the study are similar to the categories created in similar studies in the literature. This situation can be interpreted as perceiving the communication skills of different groups in similar ways.

The analysis of the total number of metaphors and metaphor frequencies in each category revealed that the highest number of metaphors were in the communication as a requirement category (7 categories in total). It could be suggested that the participants perceived communication skills as a vital requirement. The most frequent metaphor in the category was the water metaphor which is necessary to sustain life. Also, in this category, metaphors such as blood, breathing, and oxygen, which are important for human life, were mentioned as metaphors for communication skills. Similarly, Semercioğlu and Akçay (2020) found that preservice classroom teachers regarded communication as a vital concept and compared it to water and oxygen. In their study of the metaphors of university students regarding the concept of communication, Koç Akran, Acıdemir, and Uludağ (2018) found that this concept is mainly compared to water, breath, and oxygen, which are in the basic needs category. Findings obtained in the literature also support the results of this study.

The category with the least number of metaphors was the 'communication as a way to express ideas' category. Based on the participant data, the metaphors in this category included 'mirror' and 'vehicle'. Furthermore, metaphors with an active and prevalent structure (such as tree, power grid, dove, bird, and virus) were included in the communication as a dynamic phenomenon category. Metaphors emphasising non-verbal communications (such as pencil, book, colours, picture, and painting) were included in the communication as a non-verbal code system category. Furthermore, metaphors aiming to establish connections and unification (such as bond, bridge and phone) were in the communication as a unifying factor category.

A life without communication, which is an indispensable part of the phenomenon of life that starts with birth, is not possible. It is important to consider the feedback to discuss the communication process that occurs with the presence of at least two phenomena (Perçin Akgül, 2014). The communication as a requirement and mutual process categories emphasised the communication process and its properties. The analysis of the communication as a requirement category demonstrated that participants compared the communication skills to vital concepts such as water, oxygen, life, breathing, blood, fuel, and food. The communication as a mutual process category included metaphors such as agreement, exchange, barter, and commerce, which entail at least two individuals.

In their study, Özdemir, Şahin, and Öztürk (2019) determined teachers' perceptions about leadership skills of school principals using metaphors. They reported that primary, secondary, and high school teachers mentioned the 'politician' metaphor the most. Furthermore, similar to the present study, the participants also mentioned metaphors such as book, water, and telephone for the communication skills of the school principals.

In studies focusing on the communication skills of preservice social studies teachers, it was found that communication skills were positively high (Kaya, Çiftçi, & Gökdemir, 2019; Uygun & Arıkan, 2019). The study data analysis revealed that the preservice social studies teachers mentioned metaphors that included positive connotations about communication skills. Metaphors such as flowers, sun, tranquillity, and love were included in the communication as a positive connotation category.

5. Recommendations

Various recommendations are presented below based on the experiences in this study. Metaphors could be used to understand and explain a concept, value, or skill. Thus, the metaphor method could be employed to determine a set of overlooked features or how a concept, value or skill is considered. In addition to the concept of communication, metaphor studies could be conducted to understand better the content of various concepts, values, or skills in human relations and communication sub-dimensions. Participants' evaluation of communication as an indispensable part of life (like water) makes it necessary to include this skill more in practical lessons, especially in teacher training programs. In this context, using different methods, techniques, approaches, sample scenarios, situations, and activities for teaching communication skills in teacher training could be expanded.

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Adult EFL Learners' Drives to Improve Their English in Private Language Schools

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ARTICLE INFO	ABSTRACT
	The present study investigated EFL adult learners' reasons behind learning English in a new setting with a mixed-design research methodology. The subjects of this study were forty adult English language learners, 20 males and 20 females, who were learning English as a foreign language in a private English language school in Istanbul. Necessary data regarding the participants' reasons for learning English were collected through two instruments: questionnaires and interviews. The data analysis revealed that external factors such as finding a job and personal interests such as the desire to make friends urged and encouraged the participants to enrol in the private English language school to improve their English after a hard day of work or study. The study's findings concluded that both instrumental and integrative motivation played roles in the participants' drives to study English.

1. Introduction

EFL adult learners are dissimilar in terms of their levels of motivation and their reasons behind learning English. According to McDonough (2007), motivation includes "the reasons why we want to learn, the strength of our desire to learn, the kind of person we are, and the task, and our estimation of what it requires of us" (p. 369). Literature abounds with studies investigating the drives which compel EFL learners to study English. Among these reasons, the necessity to communicate and integrate with other people stand out (Setiyadi et al., 2019; Tseng, 2014; Zarrabi, 2018). The need to learn English is also felt by university students who view the English Language as a means to learn other academic and university subjects (Riemer, 2002). The rapid growth of science and technology over the last five decades and the necessity to use English as the international language in business, science, and technology have urged many adults EFL learners to view English language learning as a need to be fulfilled. Courses on English for Specific Purposes (ESP) focusing on learners' needs have been designed (Hutchinson & Waters, 1987). The necessity of learning English has even obligated some policymakers to include English in school syllabuses in most countries. Knowing students' needs assists teachers in better designing ESP courses. Rahman (2015) claims that "needs analysis is the key essence of ESP" (p. 24). English language schools tend to provide both General English (GE) and English for Specific Purposes courses (ESP) for their learners who hope to perform socially and professional activities. One of the differences between ESP and GE courses is that the focus does not necessarily have to be on the four English language skills in ESP courses, unlike GE courses (Rahman (2015). For example, an ESP course can be designed only to improve learners' business writing skills. According to Jendrych (2013), "learners need courses matching their ever-growing needs and requirements resulting from what the labour market demands" (p. 46). In almost all large cities such as Istanbul, where the study was conducted, private English language schools offer adult EFL

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learners GE and ESP courses. In Turkey, students first encounter English in elementary schools; therefore, the adult English learners who enrol in private language schools already have some background knowledge about the English language. Some of these learners are even quite proficient in English, which raises the following question:

"What other possible reasons urge them to go to private English language schools after a hard day of work or studying?"

1. 1. Adult EFL Learners' Drives

Motivation is the primary force that encourages EFL learners to initiate and sustain the English learning process (Dörnyei, 1998). Gardner and Lambert (1959) were the first to introduce the second language motivation in research. Since then, numerous studies have been conducted on adults and younger learners' motivation for English language learning and its effect on learning achievement. Motivation, in general, is triggered either internally by individuals' interests in achieving certain goals or externally by external incentives encouraged by other people or conditions. The former is referred to as intrinsic motivation in literature, and the latter is called extrinsic motivation. Pintrich and Schunk (2002) define the "motivation to engage in an activity for its own sake" as intrinsic motivation, and they define "motivation to engage in an activity as a means to an end" as extrinsic motivation (p. 245). Gardner and Lambert (1972) distinguished two different types of motivation: integrative and instrumental motivations with regards to EFL learners 'motives. The former type of motivation can be viewed as an instrument to achieve certain goals, such as getting a job promotion, and the latter is about learners' desires to learn the target language to integrate with the target culture and people. Regarding the relationships of the above written four types of motivation, it should be noted that EFL learners with extrinsic and instrumental motivation aim to achieve certain goals in the outside world, such as getting a monetary reward. In contrast, extrinsic and integrative motivation are related to internal factors such as getting to know the people who speak the target language, which urges EFL learners to learn the target language. Setiyadi et al. (2019) conducted a study to explore motivational orientations of 886 university EFL students in Indonesia. A self-report questionnaire was used to collect the data. The participants' reasons for learning English were classified into extrinsic, intrinsic, and international orientations. The reasons for learning English that fell into the extrinsic category included globalization, accessing information, getting a good job, and getting good scores in English at school. The students' reasons included mastering and enjoying learning a foreign language, travelling, and feeling more confident as to the intrinsic category. For the last category, international orientation, the participants' reasons included meeting with more English speakers, participating more freely in the activities of English speakers, making friends, and understanding the cultures of English speakers better. The findings highlighted that socio-cultural factors also played a role in encouraging the participants to learn English. Harmer (1991) refers to motivation as the "internal drive" that pushes people to perform tasks to achieve an aim. According to him, some external sources play key roles in learners' motivation. These sources include learners' goals, the setting and society in which students are learning, the people who are in touch with learners, and learners' curiosity (pp. 98-99). Some EFL learners want to learn English to immigrate to English speaking countries more easily due to some socio-political factors. Zarrabi (2018) investigated the motivations of 168 Iranian EFL learners and 159 experienced Iranian EFL teachers who were once English language learners towards English language learning. A questionnaire with open-ended questions was administered for data collection The findings showed that 37% of EFL learners and 51% of EFL teachers chose to learn English because they loved it. Another reason for learning English was educational purposes for EFL learners at 21.7%, while education accounted for 3.7% in EFL teachers. Getting a job, communication, and immigration at 13.6%, 7.1%, and 5.6%, respectively, were among other reasons in the EFL learners' group. EFL learners' reasons to learn English may differ from one setting to another. English language may be viewed differently in different settings by EFL learners. Rehman et al. (2014) conducted a study on 50 Pakistani students from a private college investigating the role of motivation in learning English. A questionnaire consisting of 20 questions was used to gather the data. The results showed that 70% of the participants' reasons for learning English included getting good marks, finding good jobs, applying for higher education, and benefit in a future career. Among other reasons were the participants' love of learning English and travelling abroad. Some participants stated that they chose to learn English because they viewed English as the upper-class language in society, highlighting how people view the English language differently. The findings also underlined the role of emotional factors in learning.

Krashen's affective filter hypothesis (1982) suggests that motivation, self-esteem and anxiety play crucial roles in second language acquisition. According to the affective filter hypothesis, the higher the level of motivation and self-esteem, the more likely language learning occurs. It should be said that there is a negative correlation between language learning and anxiety level. In his book, Second Language Acquisition and Second Language Learning, Krashen (1981) referred to integrative and instrumental motivation and their relationship with the affective filter. According to him, when integrative motivation, as defined earlier, the desire to be a member of the society which speaks the second language, is present, the affective filter is low. However, instrumental motivation, the desire to learn a second language for achieving specific ends such as improving a career, may come to a standstill when learners believe that they have learned enough to do their jobs. In a study conducted by Wimolmas (2013) to investigate the level of integrative and instrumental motivation of 30 first-year undergraduate students studying at an international institute of engineering and technology in Thailand, it became evident that the participants were highly motivated with regards to both motivation types. However, the level of instrumental motivation was slightly higher than the level of integrative motivation in the participants. Considering the role of motivation in English language learning, Hedge (2000) conducted a study that investigated the motivation of 20 ESL Japanese learners. The findings revealed that the most common reasons for studying English as a second language were communication with people overseas and understanding and getting familiar with other cultures, which can be viewed as integrative motivation. Also, the results showed that finding employment in a high-profile career and processing international information were among other common reasons for ESL Japanese learners to study English which can be considered instrumental motivation.

With regards to learning English, improving oral communication skills is crucial for most learners in most settings. Altiner (2018) conducted a study to investigate the relationship between EFL learners' willingness to communicate in English and their motivation. The participants included 106 Turkish EFL learners attending a one-year preparatory school at a university in Turkey. The study's findings indicated a significant correlation between the participants' willingness to communicate and their motivation. In another study, Tseng (2014) found speaking skills were fundamental and necessary in Asia. Tseng researched learners' needs in learning English. The results revealed that the two primary language skills in need were speaking and writing.

It should be noted that several other factors influence EFL learners' needs. Sarudin and Noor (2013) conducted a study to explore employers' views about the role of speaking English in organizations where English was used as the main language of communication. The data was gathered from 67 employers from different industries through questionnaires, including financial services, telecommunication, technology, and media industries. The findings revealed that oral communication skills such as the ability to welcome visitors, be persuasive, make business arrangements, respond to questions, and inform others were more important in the financial services than the other industries, highlighting the necessity of English learning for some employees to maintain their jobs. Needs are not static and can be prioritized, and learners' needs are in constant change. A study conducted by Pawanchik (2011) in New Zealand revealed that non-native English speakers from China, Thailand, South Korea, Qatar, and Saudi Arabia learned reading and speaking before writing and listening instruction. The results also revealed that speaking and listening skills were essential for the participants when attending exhibitions, contests, and performances. Moreover, university courses in different academic fields can also influence EFL learners' needs. Kaur and Khan (2010) conducted a needs analysis of English for art and design students in Malaysia. Through questionnaires, the data was collected and analysed. The findings revealed that 96% of the participants, including 47 students and 10 staff members, believed that English speaking was the most essential skill for their courses and their careers. Listening was the second most crucial skill based on the participants' responses at 95%. Writing and reading were regarded as fairly important skills by the participants at 80%.

Some EFL Learners' reasons for learning English are known and some others are yet to be known, and discovered. Exploring in-depth and discovering different aspects of EFL learners' drives for learning English can contribute to EFL teachers' understanding of the drives and add to their knowledge of their learners' aims and reasons for learning English, which in turn can assist them in better planning their lessons based on their learners' learning drives.

1. 2. Significance of the Study

The learners' voices need to be heard to explain why adult EFL learners pursue English learning. Relying only on experiences, intuitions, thoughts, and articulations of English teachers about their learners' reasons for learning English is insufficient and cannot give us an accurate picture of the phenomenon. Moreover, discovering more about EFL learners' drives in a new setting can help add to our knowledge and literature (Creswell, 2011). This knowledge can also assist teachers in better planning their lessons, employers in better managing their schools, and policymakers in setting better educational rules based on learners' needs and motives, which will facilitate English language learning in each setting. EFL learners' motivations involve four major elements which should be considered by teachers. EFL teachers need to know about the reasons why their learners wish to learn English. They also need to be aware that the strength of their learners' motivations is different. Moreover, EFL teachers should be familiar with their learners' personalities. They should also take into consideration that their learners have opinions and estimations about what it requires to learn English (McDonough, 2007). Acquiring information on these four elements assist EFL teachers to create a more student-centred environment. This study did not aim to investigate the impact of adult EFL learners' drives on their learning achievement, but rather it only focused on the reasons which encouraged and urged them to enrol in a private English language school in Istanbul after a hard day of work or studying which brings us to the far-reaching research question:

Why do adult EFL learners pursue English language learning in private English language schools in Istanbul, Turkey?

2. Method

The present inquiry adopted a mixed-method research design so that the research question could be understood better. Miles & Huberman (1994) claim that when quantitative and qualitative data are combined, "we have a very powerful mix" (p. 42). Since the results from both datasets were compared to show if the results supported or contradicted each other, this study adapted a convergent mixed-method design. According to Creswell (2011), a convergent mixed method design aims to collect both qualitative and quantitative data at the same time, combine them, and then "use the results to understand a research problem" (p. 540). A questionnaire specifically developed for the present study served as the quantitative actor. For the qualitative part, participants' thoughts about the issue were collected through semi-structured interviews. In so doing, the unobservable data were converted into observable data.

2. 1. Participants

40 Turkish EFL learners, including 20 males and 20 females (aged 20 to 35), participated in this study. All participants were learning English in a private English language school in Istanbul at data collection time. The data was collected from six upper-intermediate level classes. The participants had been going to school for over three months when the data collection procedure started. Of the 40 participants, 31 were university students, and nine were university graduates with jobs.

2. 2. Instruments & Data Collection Procedure

The instruments used to gather the data in this study included a questionnaire and semi-structured interviews with four participants. According to Brown (2001), "questionnaires are any written instruments that present respondents with a series of questions or statements to which they are to react either by writing out their answers or selecting from among existing answers" (p. 6). The questionnaire included 15 reasons for learning English which were driven from the literature (Appendix A). An expert opinion, a professor in linguistics, and two researchers' opinions in the field were sought to assess the content and face validity of the questionnaire. The questionnaires were distributed to the participants during their regular class session, and the participants were asked to circle or tick the items which best explained their needs and reasons to learn English. The participants could also add to the given reasons by writing more reasons in a blank paragraph inserted at the bottom of the questionnaire. However, no additional reason was indicated by the participants. Upon completion, which took less than 15 minutes, the questionnaires were collected. For the semi-structured interviews, the participants were asked five open-ended questions (Appendix B). Four interviews were conducted, all of which were recorded, then transcribed, and finally codified. Probes were used to help the

participants better clarify and elaborate on their responses during the interviews. In order to protect the participants' anonymity, pseudonyms were given to them.

2. 3. Trustworthiness

Unlike quantitative research, researchers doing qualitative studies conclude based on their interpretations of their participants' voices. A qualitative study has validity if its findings represent reality (Field & Morse, 1985; Hinds et al., 1990). Also, a qualitative study is reliable if its findings are replicable and stable (Kirk & Miller, 1986). Lincoln and Guba (1985) first introduced the general term "trustworthiness" to address reliability and validity in qualitative research. The following three steps were taken to ensure the reliability of this study.

2. 3. 1. Triangulation

Creswell (2011) defines triangulation as "the process of corroborating evidence from different individuals (e.g., a principal and a student), types of data (e.g. observational field notes and interviews), or methods of data collection (e.g. documents and interviews) in descriptions and themes in qualitative research" (p. 259). In this study, the first and second data collection instruments i.e., the questionnaire and semi-structured interviews, were triangulated with the participants' comments on why they were studying English in the language school. However, as mentioned earlier, no comment was given by the participants.

2. 3. 2. Member checking

The collected data were codified, and the categories were applied. Then, the participants were asked to comment on the categories to check if they made sense based on what they had expressed in the interviews.

2. 3. 3. External Audit

External experts' comments on a study can enhance the trustworthiness of its findings. An external auditor who was a professor in linguistics was asked to comment on the codes and categories.

2. 4. Data Analysis

The data analysis was based on the frequency of the participants' selection of the reasons from the questionnaire From the highest to the lowest, the selected reasons were calculated to clarify the most and the least important reasons for learning English among the participants. As for the interviews, four participants were selected who were willing to be interviewed. All four of the interviews were recorded to be transcribed. The interviews were initially transcribed by hand to codify the data obtained. Then, the transcriptions were broken down into meaningful chunks, i.e., each question of the four interviews was examined, compared and codified, which finally led to the emergence of categories. The analysis of the interviews followed a bottom-up approach initiated by words, sentences, codes, and categories, and ending with interpretations. Robson (2002) indicated the importance of discovering the messages hidden in the data before interpreting the data. According to him, the implicit messages which lie in the data "need careful teasing out" (p. 387).

3. Results

3. 1. Questionnaire

A 15-item questionnaire was given to 40 EFL students to identify Turkish EFL learners' drives for learning English.

As shown in Table 1, the most crucial reason why the participants enrolled in the school and attended the classes was to get a job at 80%, which can be regarded as instrumental. The second most important reason at 72.5% for the participants was for understanding English films and videos. The percentage of the third and fourth reasons for learning English, for travelling and academic purposes, were similar at 65%. Learning English to take English exams such as TOEFL, YDS, or IELTS was the fifth important reason at 62.5%. Working abroad was the sixth reason at 57.5%. However, immigration was the least important reason for the participants at 7.5%. Emulating peers and friends for learning English, with a slight increase, was the second least important reason at 10%. The third least important reason was for using the internet, at 17.5%. Making friends with foreigners and making professional contacts with foreign colleagues were both similar at 30%.

Table 1. *Reasons for Learning English by Percent*

Reasons for learning English	No: 40	Percentage
1. For doing my job/profession	32	80%
2. For understanding English films, videos	29	72%
3. For travelling	26	65%
4. For academic purposes	26	65%
5. For taking an exam (for example TOEFL, YDS, or IELTS)	25	62.5%
6. For working abroad	23	57.5%
7. For reading English newspapers, magazines, and books	19	47.5%
8. For doing a job interview	17	42.5%
9. For having a higher salary	16	40%
10. For making friends with foreigners	12	30%
11. Professional contact with foreign colleagues	12	30%
12. Learning English is a hobby for me	9	22.5%
13. For using the internet	7	17.5%
14. I am learning English because my friends are also learning English.	4	10%
15. For immigration	3	7.5%

3. 2. Interviews

As for the interviews, four participants who were willing to be interviewed were selected. The recorded semi-structured interviews were fully transcribed, and then the transcriptions were broken down into their salient segments. In the first coding phase, the four participants' actual words were used to honour their voices. In the literature, this is called in vivo coding. According to Saldaña (2015) "In Vivo Codes use the direct language of participants as codes rather than researcher-generated words and phrases" (p. 48). Following that, the second cycle of coding began, and finally, six categories shown in table 2 emerged.

Table 2. *Categories*

Second cycle of coding	Categories
Job / Career	
Writing e-mails	
Improving writing skills	
Living abroad	
Making friends	
Improving speaking and writing skills	Getting a job
Taking some exams such as TEOFL or IELTS for entering a university	Making friends
	Taking English language proficiency tests Improving
Speaking is difficult and embarrassing	writing skills
Self-studying, not regularly, to improve listening skills	Improving speaking skills
Good English language schools make the students speak English	Improving listening skills
English language School should make the students	
Lessons should be focused on listening and speaking skills	
Schools should have more native speaker English teachers	
Not using L1 in classrooms	

For question number one, "Why are you learning English?" only one participant, Ahmet, stated that he was learning English for immigration. He said: "I am learning English because I want to go to a foreign country, and I want to live there". However, for the other three participants, finding a job was their main reason for learning English. Regarding the first question, one participant also stated that she was learning English to earn a higher salary and to be able to write e-mails. She said: "I want to improve my English because when I write an e-mail somewhere abroad, I want to write in good language and get a high salary, and it is important because life is expensive". Another participant, Ali, also highlighted that he was learning English to make friends. He said, "I am learning English because it is important to make friends. For the second interview question, "What is important for you in learning English?"; there were similar responses. They all agreed that

speaking was the most important skill to learn. For example, Ahmet said: "I guess speaking is important for me". Hakan also said: "to speak fluently and understand other people. Three of the four participants said that writing in English was important as well. One of them added that English was important to take English exams such as IELTS and TOEFL. Ahmet said: "I must pass the exam. TOEFL or IELTS for university for college." When the participants were asked about the amount of time, they spent practising English regularly outside the classrooms; they said that they did not practice regularly, and they did not spend enough time practising English. Ahmet said: "Sometimes never, but sometimes if I want…. I spend almost one hour." Hakan said: "Thirty minutes a day.", and Ali said: "Ok. Not regularly, but I try to study every day". The fourth question was about English courses in general and the factors that could improve them from the participants' points of view. The participants highlighted in their responses that the importance of speaking practice in the classrooms had to be the top priority for English language courses. For example, Ali said: "I think they must teach speaking; speaking skill is important". The last question addressed the things to be done to improve the school, where the study was conducted. Three of the participants emphasized the important role of foreign teachers and English-speaking practices in the classrooms. Ali said: "I think a foreign teacher is important. Their speaking is improving our listening". Ahmet said: "they have more foreign teachers". The participants' responses to the interview questions revealed that although some reasons such as making friends and taking English exams encouraged them to learn English, improving speaking skills was of prime importance.

4. Discussion

Analysis of the questionnaires revealed that finding a job and learning English for academic purposes with having the first and the fourth rates respectively were two main reasons for the participants to learn English, highlighting the great importance of needs analysis for ESP courses (Rahman, 2015). Some previous research findings (Setiyadi et al., 2019; Tseng, 2014; Zarrabi, 2018) indicated that communication was the main reason for adult learners to learn English. However, the findings of this study based on the participants' responses to questionnaire items showed that the main reason for the participants in this new setting was related to building a professional career as well as finding a job, which highlighted the participants' instrumental motivation as well as the socio-economic factors urging them to improve their English knowledge. In this new setting, the findings also revealed that most of the participants were not keen on immigrating to other countries. Instead, they wanted to learn English mainly to take some English exams such as YDS, TOEFL, and IELTS, a prerequisite to enter university, do their bachelor's degree or undertake postgraduate studies. This indicates that EFL learners' goals and reasons may differ from one setting to another (Pawanchik, 2011). Having easy access to the internet and the availability of mobile phones and tablets in most parts of the world, including Turkey, have encouraged EFL learners to watch English films and read books online, which partly explains why the participants of this study selected "understanding English films, videos" as the second most important reason for learning English. The interview data analysis showed that finding a job and building a professional career were the main reasons for learning English. The finding matched perfectly with the results obtained from the questionnaires, indicating that 80% of the participants wanted to learn English for the same reason, which highlights the role of instrumental motivation as a drive to urge EFL learners to continue learning English (Rehman et al., 2014; Sarudin & Noor, 2013; Zarrabi, 2018).

The participants' responses about the second question, "What is important for you in learning English?", are consistent with the findings of the studies conducted by Hedge (2000) and Tseng (2014), highlighting communication and speaking as one of the main reasons for the participants to learn English. Improving writing skills was as essential as emphasising individual needs to perform current or future professional activities. The participants' responses revealed that they did not spend much time practising English, and their practice included mainly watching English movies and reading English books, which explains why the participants preferred English lessons focusing more on production and speaking activities. The study revealed that certain factors affect the participants' drives to improve their English. These factors include socio-cultural and socio-political factors, university admissions, job requirements, availability of the internet, the need to improve specific skills in English such as writing and communication, which further indicates a multifaceted problem facing English language teachers and schools to meet EFL learners' needs.

5. Conclusion

The study found the most important reasons to encourage the participants to learn English after a hard day of work in their offices or to study at their universities. These included finding a better job, improving their speaking skills for communications and making friends, improving their listening skills to understand English films and videos, immigration, improving writing skills, and taking an English exam (for example, TOEFL, YDS, or IELTS). The findings also showed that the least important need to learn English for the participants was immigration. Based on the results obtained from the interviews, it became evident that improving speaking was of prime importance for the participants. The participants were also keen on improving their writing skills to write formal texts such as emails at work, which explains why finding a job and building a professional career were selected by most participants. The results obtained from the interviews revealed that the participants preferred a more active classroom environment focusing on speaking activities and less grammar practice. The findings also revealed that the participants expected their teachers to focus on productive skills such as speaking and writing. Practising speaking was the participants' most significant challenge. It should be noted that speaking Turkish by teachers during lessons was the reason why the participants preferred foreign English teachers, which highlighted that the participants preferred the use of L1 in the classroom to improve their listening and speaking skills. All these findings have relevant implications and should therefore lead to recommendations for further training or studies. It should be stated that this study was not without its limitations. The first limitation was the number and level of English of the participants. In this study, the participants' level of English was upper-intermediate. Future studies can include different proficiency levels of participants and investigate whether proficiency levels of participants affect their reasons for learning English. Future studies can be conducted in different private English language schools in different settings to explore the EFL learners' reasons to learn English more in-depth.

6. Implications

The results of this study have specific general implications for EFL teachers and policymakers. EFL teachers working for private language schools should consider the setting they are teaching and plan their lessons accordingly. In learner-centred approaches such as the communicative approach, learners' needs are essential and should be met. Brindley (1989) defines the need as "the gap between what is and what should be" (p. 65). Planning lessons based on learners' needs and requirements can help teachers and educators achieve the objectives of their lessons and courses. As an ice breaker for the first lesson, a simple questionnaire about the needs and the reasons why their students are learning English should be prepared by EFL teachers. After handing out the questionnaires, EFL teachers should get their students to ask their classmates about the needs and why they are learning English and write the reasons down. Finally, the need and the reasons which all students agree unanimously could be written down on the board. Through this simple way, EFL teachers could plan their lessons and choose activities based on their students' needs, which will help them meet their students' needs more efficiently, which will also help EFL teachers create a more learner-centred class environment. Policymakers and directors of studies at private English language schools can benefit from the results of this study while choosing course books for their schools. They should look for English coursebooks focusing more on communication and less on grammar. Some extra ESP lessons can also be added to the syllabus apart from the regular general English lessons. Moreover, more essay writing practices should be included in the school syllabus to help students prepare for English language tests such as TOEFL and IELTS.

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Appendix A. The Questionnaire

Name: …………………………………   Age: …………………………………

University: …………………………………   Job title: …………………………………

How long have you been learning English? …………………………………

What is the most important reason that you need English for? You can choose more than one. Circle the one you choose.

1. For travelling

2. For doing my job/profession

3. For academic purposes

4. For taking an exam (for example TOEFL, YDS, or IELTS)

5. For making friends with foreigners

6. For immigration

7. For reading English newspapers, magazines, and books

8. For working abroad

9. For understanding English films, videos

10. For having a higher salary

11. For doing a job interview

12. For using the Internet

13. Professional contact with foreign colleagues

14. I am learning English because my friends are also learning English

15. Learning English is a hobby for me

16. Other reasons

If you have other reasons for learning English apart from the above written reasons, please write them below.

………
………
………

……
……………………

Appendix B. Interview Questions

Date: …………………………………   Time: …………………………………

Place: …………………………………   Interviewee's full name: …………………………………

1. Why are you learning English?

2. What is important for you in learning English? Which areas of English are the biggest problem   for you?

3. How much time do you regularly spend working on your English outside classes? How do you practice on your own?

4. What do you think makes an English course a good one? What activities? What about the atmosphere?

5. What about British time? How would British Time be a better language school? What should   British time do to be a better language school?

The Relation of Metacognition, Personality, and Foreign Language Performance

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ARTICLE INFO	ABSTRACT
	Metacognition is a significant predictor of learning and academic performance, including foreign-language performance. However, variations in metacognitive competence can be observed due to several factors, potentially including personality. Analytic survey research methods were implemented to examine the relation between metacognition and personality traits and their interaction with foreign-language performance. Data were collected from 244 participants via the Turkish Metacognitive Awareness Inventory, Basic Personality Traits Inventory, and records of foreign language performance grades. Spearman's correlation and multiple linear regression tests were used for data analysis. Results confirmed that Conscientiousness, Openness to Experience, and Agreeableness explained 20% of metacognitive knowledge, and 16% of metacognitive regulation was attributed to Conscientiousness and Openness to Experience. Compared to other language skills, it was merely reading performance correlating with metacognitive knowledge and metacognitive regulation. On the other hand, language use was positively correlated with metacognitive regulation. Regression analyses identified that only personality traits but not metacognition predicted foreign-language performances. Conscientiousness and Extraversion predicted reading performance, and Conscientiousness and Openness to Experience were significant predictors of language use performance. These findings may suggest that personality influences foreign language reading performance, language use performance, and metacognition. Therefore, pedagogical implications may reflect individual differences, especially when delivering foreign language instruction or metacognition training modules.

1. Introduction

Some foci need allocation to individual differences regarding cognitive, behavioral, and/or affective domains in education. Such an emphasis is necessary to understand and scaffold learners' experiences and interpret learning outcomes. Schwab's (1978) explanation of education can be referred to recognize the impacts of individual differences. According to Schwab (1978), education teaches *something* to *someone else* in *some context* (Alexander, Murphy, & Greene., 2012, p. 17 emphasis in original)*.* In this definition, *someone* may be teachers or peers doing teaching. On the other hand, s*omething* might refer to the content or *learning how to learn* as Alexander, Murphy, and Greene (2012) highlighted. *Someone else* refers to learners and s*ome context* can be defined as the nature or the climate of the classrooms (Alexander et al., 2012).

Alexander et al. (2012) noted that these education variables are not additive, but multiplicative; 'Education=Someone x Something x Someone else x Some context' (p.19). For this reason, variations in any factors produce variations in educational outcomes. That is, although the same teacher teaches learners the

same topic in the same classroom, variations that relate to, for example, expectations, predispositions, capabilities, or experiences in *someone else* can produce distinctive learning experiences and/or outcomes.

1.1. Problem and Purpose of the Research

Metacognition is an essential tool for learning (Fisher, 2002; Kerndl & Aberšek, 2012) and it is also a significant predictor of learning (Veenman, 2016). Metacognition helps individuals manage cognitions strategically and efficiently (Gourgey, 1998) by improving 'reading comprehension, writing, language acquisition, attention, memory, problem solving' (Flavell, 1979, p. 906). Learners, however, may show variations in metacognitive adequacy because of the differences in social interactions, opportunities of acquiring metacognition, and attitudes to obtain such a repertoire (Veenman, Van Hout-Wolters, Afflerbach, 2006)

While some individuals might be metacognitively competent, some might lack sufficient adequacy to perform metacognition or lack it al all. Veenman et al. (2006) argued that some individuals may 'spontaneously pick up metacognitive knowledge and skills to a certain extent' (p.9) from individuals around them. Some others might develop such competencies on their own. However, there might be some individuals who suffer from availability or production deficiency of metacognition. Individuals with availability deficiency do not possess sufficient amount of metacognitive knowledge and cannot exercise regulatory strategies effectively. On the other hand, individuals with production deficiency might have some amount of metacognitive knowledge or skills. However, they fail to manage metacognitive regulation for various reasons, including, for example, anxiety, task-difficulty, lack of motivation, or inability to see the relevance of metacognition in different situations (Veenman et al., 2006).

While research examined relations between metacognition and academic achievement as presented in the following section, an understanding of the relation between individual differences (i.e. personality) that students bring to the classroom and metacognition is limited. Regarding Duff, Boyle, Dunleavy, and Ferguson's (2004) argument that personality may partially determine individuals' orientations and approaches to learning, this study hypothesized that some personality traits might help determine metacognitive competency. Also, as learning orientations or approaches can be a learnt component of personality (Furnham et al., 1999), cognitive performances (i.e. foreign language skills' performance) might be indirectly predicted by metacognition and directly by personality traits. For these hypotheses, the following questions will be answered in this study;

1. Is there a relation among metacognition, personality traits, and foreign language skills performance scores?
2. To what extent do personality traits and metacognition predict foreign language performance scores, if at all?

1.2. Literature Review

1.2.1. Metacognition

Metacognition pertains to thinking about thinking (Flavell, 1979; Veenman et al., 2006). According to Flavell (1979), actions and interactions of metacognitive knowledge and metacognitive regulation control cognitions during metacognitive experiences. Metacognitive knowledge includes variables about thinking and sensitivity to think accordingly. Precisely, it consists of individuals' knowledge about *self, task demands, goals, resources*, and *strategies*. Such knowledge pertains to individuals' knowledge about;
- Who they are in the specific context of task demands, available resources, and goals,
- What is available for them and/or what their capabilities are to tackle task demands,
- What they aim for,
- What the task requires them to do,
- Whether and how they can manage resources to fulfill task demands and/or attain goals,
- Whether and how they manage appropriate strategies to achieve task demands and/or goals, and
- Why they engage in all these endeavors (Ozturk, 2017).

The previous component of metacognition help individuals judge and take the initiative to regulate their cognitive performances (Flavell, 1979; Veenman, 2016). On the other hand, metacognitive strategies enact regulatory mechanisms over cognitions for successful mastery of task demands or achievement of

performance goals (Baker & Brown, 1984; Kuhn, 2000). This aspect pertains to the strategies of planning, monitoring cognitions, regulating strategies, and evaluating one's performances or goal attainment. Metacognitive knowledge and regulation can be practised via metacognitive experiences. Flavell (1979) defined metacognitive experiences as conscious intellectual enterprises usually accompanied by highly conscious thinking. These are the mechanisms that modify metacognitive knowledge and help individuals activate regulatory strategies for cognitive endeavours.

1.2.1.1. Metacognition and academic achievement. Flavell (1979) emphasized metacognition's importance for cognitive endeavours. After his initial arguments, research confirmed that metacognition impacted learning or achievement positively (e.g. Desoete, Roeyers, & Buysse, 2001; Klingner, Vaughn, & Schumm, 1998; Michalsky, Mevarech, & Haibi, 2009; Muñiz-Swicegood, 1994; Van Keer & Vanderlinde, 2010). Indeed, it can be a significant distinction between high and low achievers (Paris et al., 1984; Pogrow, 2004). Moreover, the research provided evidence that metacognition can be taught (e.g. Cross & Paris, 1988; Takallou, 2011; Tanner, 2012; Zhang & Seepho, 2013). Following such training, students' awareness, responsibility-taking, and performances might improve significantly (Boulware-Gooden, Carreker, Thornhill, & Joshi, 2007; Cross & Paris, 1988; Curwen, Miller, White-Smith, & Calfee, 2010; Veenman et al., 2006). However, such training might not affect all learners in the same way (Ozturk & Senaydın, 2019). They found that highly proficient foreign language learners might benefit from metacognition training most when compared to low or average proficient language learners.

1.2.2. Personality

Cognition pertains to what individuals can do and personality traits can reflect what they will do (Furnham & Chamorro-Premuzic, 2004). Personality pertains to relatively stable and essentil aspects of the self (Maltby et al., 2007). The Five Factor Model (FFM) of personality studies variations among individuals regarding consistent cognitive, emotional, and behavioural patterns (Gençöz & Öncül, 2012). To McCrae and Costa (2003), traits are degrees of variation across dimensions hieratically organized and impacted by the native language.

Well-known FFM personality dimensions include Extraversion, Agreeableness, Conscientiousness, Openness to Experience, and Neuroticism (Goldberg, 1990, 1993). Extraversion is defined via positive affectivity and social interactions, whereas Extraverts are sociable, fun-loving, affectionate, friendly, and talkative and enjoy others' company. Agreeableness is also characterized by high quality in social interactions and social support. It is associated with trust, altruism, empathy, kindness, and affection. Agreeable individuals are cooperative rather than competitive and even manipulative. On the other hand, Conscientiousness signifies goal-directed behaviour and strategies to handle frustration during task completion. It is characterized by adjectives such as hardworking, ambitious, energetic, and persevering. Such individuals are self-disciplined, well-organized, goal-oriented, and habitually careful. Moreover, Openness to Experience can reflect the flexible part of the personality, and it can be associated with self-esteem and positive affect. Openness to Experience can be characterized by originality, imaginativeness, broad interest, and daring nature. Such individuals might tend to see themselves as more intelligent and interestingly others might also think about them, so (Gençöz & Öncül, 2012; Goldberg, 1990, 1993; Mccrae & Costa, 1987). Neuroticism, on the contrary, is associated with (a) psychological distress such as worrying, feeling insecure, self-conscious, (b) negative affectivity such as anxiety, depression, anger, and embarrassment and (c) maladaptive coping strategies like hostile reactions, wishful thinking, mistrust, smoking, overeating, or drinking excessively. Neuroticism might include not only negative effect but also distributed thoughts and behaviours accompanying emotional distress. This study uses a Turkish personality inventory regarding the lexical hypothesis; therefore, another dimension -Negative Valence- needs some explanation. It is an aspect that contributes to psychological well-being negatively, like Neuroticism. Gençöz and Öncül (2012) argued that Neuroticism is closely related to distress and anxiety, whereas Negative Valence pertains to self-worth (see Table 1).

Table 1. *Personality Traits and Characteristics*

Personality traits	Characteristics
Extraversion	*Positive affectivity & Social interactions*
	Sociable, fun, loving, affectionate, friendly, and talkative
Agreeableness	*Social interactions & Social support*
	Trust, altruism, empathy, kindness, cooperation, and affection
Conscientiousness	*Goal-directed behavior & Use of strategies*
	Hardworking, ambitious, energetic, self-disciplined, well-organized, careful, goal-oriented, and persevering
Openness to Experience	*Self-esteem & Positive affect*
	Original, imaginative, broad interest, daring
Neuroticism	*Negative affectivity, Psychological or emotional distress & Maladaptive coping strategies*
	worrying, feeling insecure, self-conscious, anxiety, depression, anger, and embarrassment, hostile reactions, wishful thinking, mistrust, smoking, overeating, or drinking excessively.
Negative Valence	*Negative well-being*
	Low self-worth

1.2.2.1. Personality and academic achievement. Personality can play a role in developing knowledge and academic performance (Chamorro-Premuzic & Furnham, 2003a). That is, learners' choices, level of persistence, and engagement in intellectually stimulating activities may be directed by personality traits (Chamorro-Premuzic & Furnham, 2003b).

Previous research provided some divergent evidence for the relation of personality traits and academic performance. Few personality traits were either positively (i.e. Conscientiousness and Openness to Experience) or negatively (i.e. Neuroticism) correlated with academic achievement. However, the relation between other personality traits and academic achievement were inconsistent. Agreeableness and Extraversion did not correlate with academic achievement. When they were correlated with academic achievement, the direction of the correlation was controversial, as presented in the following.

Similar to the findings of a meta-analysis study done by O'Connor & Paunonen (2007), different studies reported positive correlations between Conscientiousness and academic success at different school levels (e.g. Chamorro-Premuzic & Furnham, 2003b; Conard, 2006; De Fruyt & Mervielde, 1996; Duff, Boyle, Dunleavy, & Ferguson, 2004; Kappe & van der Flier, 2010). Such a positive correlation is often interpreted in terms of motivation and learner-characteristics of being hard-working, organized, disciplined, and ambitious (Chamorro-Premuzic & Furnham, 2003a; Kappe & van der Flier, 2010; O'Connor & Paunonen, 2007). Also, Openness to Experience was correlated with L2 (English as a foreign language) test scores (Meyer et al., 2019) or academic performance positively (Hirschberg & Itkin, 1978; Shuerger & Kuma, 1987). Furthermore, research findings for the correlations between Extraversion and academic performance present an irregular pattern. In some studies, such as Chamorro-Premuzic and Furnham's (2003a), no correlation was found between academic performance and Extraversion. However, Sanchez-Marin, Rejano-Infante, and Rodriguez-Troyano's (2001) and O'Connor and Paunonen`s (2007) reported that Extraverts performed worse in academic settings, possibly because of distractibility, sociability, and impulsiveness. Nevertheless, Duff and colleagues (2004) argued that Extraversion is positively correlated with a strategic and profound approach to learning.

Agreeableness was mostly found unassociated with academic performance (Chamorro-Premuzic & Furnham, 2003b; O'Connor & Paunonen, 2007). Chamorro-Premuzic and Furnham (2003b) argued that Agreeableness might be irrelevant to learning processes or examination performance. Duff and colleagues (2004) argued that Agreeableness may be related to the surface approach to learning and negatively correlated with academic performance.

Neuroticism, however, was found negatively correlated with academic performance (Chamorro-Premuzic & Furnham, 2003a, 2003b; De Fruyt & Mervielde, 1996; O'Connor & Paunonen, 2007) and positively correlated with surface approaches to learning (Duff et al., 2004). Stress or anxiety might be some potential reasons for such findings (Chamorro-Premuzic & Furnham, 2003a; Zeidner & Matthews, 2000). It might also be that

emotionally stable individuals perform better academically than more neurotic individuals (Chamorro-Premuzic & Furnham, 2003a).

1.3. Research on Metacognition and Personality Traits in Foreign Language Learning Context

The number of research studies examining the relation among metacognition, personality traits, and foreign language performance (FLP) and/or achievement (FLA) is not ample. However, extant studies which examined the relation between (a) metacognition or (b) personality traits and FLP or FLA provided some grounds for this study. These studies will be reviewed chronologically to identify the trends in research and potential limitations as in the following.

Fayyaz and Kamal (2011) provided evidence for the relationship of personality traits and metacognitive listening skills in a foreign language learning context. They found that Neuroticism negatively correlated with metacognitive listening skills while Openness to Experiences had a positive relation with metacognition. Agreeableness did not have a relation with metacognition. Moreover, Conscientiousness was a highly significant predictor of metacognitive listening skills. Openness to Experiences and Conscientiousness explained 20% of the variance in reported metacognitive listening skills. Similarly, Fazeli (2012) found that foreign language learners' metacognitive strategy use correlated with some traits; Extraversion, Openness to Experience, and Conscientiousness, positively and with Neuroticism, negatively. Fazeli (2012) also reported that Conscientiousness and Openness to Experience explained 17.7% of the metacognitive strategy use while learning a foreign language.

Ayhan and Turkyilmaz (2015) also examined the relationship between foreign language learners' metacognitive strategies and personality traits. They found that Extraversion, Openness to Experience, Agreeableness, and Conscientiousness significantly correlated with metacognitive language learning strategy use. Also, Öz (2016) recently reported a significant relationship between personality traits and metacognition. In his study, personality had a substantial impact on determining metacognitive awareness. Furthermore, personality traits explained 29% of the variance in metacognitive knowledge and 28% of the variance in metacognitive regulation. Also, Openness to Experience and Extraversion were the strongest predictors of academic motivation. Moreover, Wahdah, Ainin, and Hamid (2018) examined Dayakese learners' personality traits and foreign language learning strategies. They found significant correlations between (a) Neuroticism and metacognitive strategies and (b) Openness to Experiences and metacognition.

Kelly and Donaldson (2016) carried out an a study investigating the relationship among metacognition, personality, and academic performance. They reported a significant relation between (a) metacognition and academic performance, (b) Conscientiousness and academic performance, and (c) Conscientiousness and metacognition. In total, 13% of the variance in academic performance was explained by metacognition and Conscientiousness. Their multiple regression analysis revealed that metacognition was not a significant predictor of academic performance; however, Conscientiousness was. Kelly and Donaldson (2016) argued that metacognition may depend on personality; when the Conscientiousness is high, metacognition can predict academic success. In other words, when individuals are Conscientious, they can practice metacognition.

1.3.1. Short reflection on the previous research of metacognition, personality, and foreign language performance. Previous research findings confirmed that metacognition and personality traits correlate in the context of foreign language learning. Mostly, Neuroticism was reported for its negative correlation with metacognition while Openness to Experience and Conscientiousness were positively correlated with metacognition. Only few studies (i.e. Kelly & Donaldson, 2016; Öz, 2016) investigated the predictive power of personality traits on metacognition and/or academic achievement. These studies' findings proposed that metacognition might have an indirect effect on academic achievement due to the personality trait of Conscientiousness and/or Openness to Experience.

However, previous findings imposed some limitations. Those studies approached latent variables as a single unified construct. While foreign language performance might be assessed as skills; listening, reading, writing, and speaking, some of the studies measured it as a single score. Similarly, metacognition was measured as a single construct in some studies, while its measurement instruments usually represent at least two factors. Moreover, while metacognition might be a learned component of personality except the last study done by Kelly and Donaldson (2016), none of the studies could grasp a holistic picture of achievement, metacognition,

and personality. This study recognizes that personality traits may facilitate metacognition, and it may be an important indicator of learning or academic success (Fisher, 2002; Kerndl & Aberšek, 2012; Pogrow, 2004; Veenman, 2016; Wang et al., 1990).

2. Method

2.1. Research Design

This study positioned in the quantitative realm. Survey research methods were implemented to describe and interpret the potential relation among metacognition, personality traits, and foreign language performance scores. To Cohen, Manion, and Morrison (2018), education surveys often use test scores, self-report questionnaires and attitude scales, and they can be used to explore or confirm assumptions and hypothesis. Surveys can also be descriptive or analytic. While descriptive surveys describe data, analytic surveys test hypothesized predictors or variables for their influence on dependent variables or relationships among them, as done in this study.

2.2. Participants

Two hundred forty-four (244) students enrolled in the School of Foreign Languages at a state university in Izmir participated in this study. They studied English as a foreign language for two academic semesters at the A2 level. The school complies with the descriptions of foreign language proficiency offered by Common European Framework for Reference for Languages (CEFRL, Council of Europe, 2001). Participants were selected via convenience sampling method for the primary data of academic achievement. The School of Foreign Languages used an institutional standardized scoring matrix for the proficiency tests.

2.3. Data Collection Tools

In this study, two inventories were employed to collect data of personality traits and metacognition data after getting Ethical approval (Ege University, no: 70995613-604.01.01-E.214516). Also, participants' foreign language performance indicators were provided to the author as in excel sheets by the head of the students' affairs office after providing them with the Ethics board approval.

2.3.1. Turkish personality traits inventory. A Turkish personality inventory (BPTI) was used to collect personality data. It was developed by Gençöz and Öncül (2012) regarding the lexical hypothesis. The lexical hypothesis suggests that every culture has its trait adjectives to communicate individual differences (Digman & Inouye, 1986). Regarding Turkey's characteristics such as rapidly changing sociopolitical attitudes, mobility dynamics, collectivistic nature, and the mixture of traditionalism and modernity, Gençöz and Öncül (2012) examined the factor structure of the personality traits in Turkish culture.

Their psychometric analysis produced an inventory that consisted of 45 items rated on a 5-point Likert scale, ranging from *(1) this characteristic does not represent me at all* to (5) *this characteristic represents me very well*. The inventory was factored on six traits; Extraversion, Conscientiousness, Agreeableness, Neuroticism, Openness to Experience, and Negative Valence. This inventory can explain 53% of the variance in personality traits. Internal reliability coefficients for six factors were between .71 and .89.

2.3.2. Turkish metacognitive awareness inventory. Turkish Metacognitive Awareness inventory (TMAI) was used to collect metacognition data. It was adapted to the Turkish language by Akın, Abacı, and Çetin (2007), as the original Metacognitive Awareness Inventory (MAI) was developed by Schraw and Dennison (1994). The correlation analysis produced a relation of .95 between the MAI and TMAI.

Following exploratory factor analysis, it was found that TMAI produced a two-factor solution with eight subcomponents. Internal consistency and test-retest reliability analyses were .95. Similar to the original MAI, TMAI can also be rated on a 5-point Likert scale ranging from *(1) never* to *(5) always.*

2.3.3. Foreign language performance scores. Following the Ethics board approval for this study, the head of the students' affairs office collected participants' second-semester achievement data at the end of the spring semester via the institution's online database. Then, she gave the author participants' achievement data in excel sheets. This data set was represented as performance scores of language skills (i.e. reading, language use- grammar-, writing, speaking, and listening).

The data set included three mid-term exam scores representing English as a foreign language performance within the second semester. Each midterm score was equalled to 85, and these exams included listening (rated out of 15), language use (rated out of 15), writing (rated out of 20), and reading (rated out of 35) sections. At the end of the semester, learners also took a speaking exam (rated out of 15). These exams were prepared and standardized by the testing unit. The test writers were anonymous to the school and they were appointed to this position by the head of the School of Foreign Languages. At the end of each semester, listening, language use, writing, and reading sections' scores were averaged by the institutional scoring matrix to determine students' performance.

2.4. Data Analyses

Data were analyzed through two sets of statistical tests on SPSS and AMOS. The variables displayed non-normal distributions (e.g. speaking, listening, writing scores and personality traits) except metacognitive knowledge, metacognitive regulation, and reading scores. Q-Q plots identified outliers and normality tests violated H_0 (Kolmogorov-Smirnov and Shapiro-Wilks tests $p \leq .05$), and histograms were skewed. Sampling technique also imposed limitations on using parametric tests; therefore, non-parametric correlation (Spearman's) tests were run.

Correlation analyses showed evidence only for reading performance scores' correlation with both metacognitive knowledge and regulation and language use performance scores' correlation with metacognitive regulation. The distribution of reading and language use performance scores were normal and the residuals were normally distributed. After the assumptions (linearity of the model, no multicollinearity, and homoscedasticity) were checked and met, parametric multiple regression analyses were run for reading and language use. Finally, a path analysis was created on AMOS for reading and language use.

3. Findings

In this section, test results will be presented to answer the research questions. Descriptive statistics (medians) will initially be presented to identify dominant personality traits and metacognitive competency in the sample group.

3.1. Descriptive Statistics for Personality Traits and Metacognition

In this study, Agreeableness was the dominant personality trait (M=4.2). It was followed by Openness to Experience (M=3.7), Conscientiousness (M=3.6), and Extraversion (M=3.5). Neuroticism (M=2.6) and Negative Valence (M=1.3) was subordinate personality traits. Regarding metacognition, participants were quickly identified as metacognitive individuals. Their self-reported metacognitive knowledge (MK) was M=3.7, and metacognitive regulation (MR) was M=3.4.

Table 2. *Medians for Personality Traits and Metacognition for the Sample*

Domains	M
Agreeableness	4.2
Openness to Experience	3.7
Conscientiousness	3.6
Extraversion	3.6
Neuroticism	2.6
Negative Valance	1.3
Metacognitive Knowledge	3.7
Metacognitive Regulation	3.4

3.2. Relations among Metacognition, Personality Traits, and Foreign Language Performance

A set of Spearman's rho correlation tests identified correlations among FLP represented as skills, personality traits, and metacognition $p< .01$ as seen in **Hata! Başvuru kaynağı bulunamadı.**. Interesting findings pertain to metacognition and personality traits. In this study, Extraversion, Conscientiousness, Agreeableness, and Openness to Experience were positively correlated with MK, while Neuroticism was negatively correlated with MK ($p <.05$). Also, Conscientiousness, Openness to Experience, and Agreeableness correlated with MR positively ($p <.05$).

Findings also confirmed some correlations between FLP scores and metacognition. As for metacognition, reading performance scores were the only ones correlating with both MK and MR positively ($p<.05$). However, language use scores only correlated with MR positively ($p< .05$). Other skills did not provide any evidence for correlations with metacognition ($p >.05$).

Moreover, the correlation pattern between FLP and personality traits was thought-provoking. It is only written channels of communication, i.e. reading, writing, and language use (grammar), correlated with three personality traits, either negatively or positively. Reading ($r_s=.148$) and language use ($r_s=. 275$) performances were positively correlated with Conscientiousness, $p < .05$; however, they were negatively correlated with Extraversion, $p< .05$. Moreover, language use and writing performances were negatively correlated with Openness to Experience, $p< .05$.

These findings highlighted that metacognition and some personality traits seem to correlate with reading and language use performance scores similarly. In the following analysis will elaborate on the predictive power of personality traits and metacognition on reading and language use performance scores.

Table 3. *Correlations among Metacognition, Personality Traits, and Foreign Language Performance Scores*

Variables	1	2	3	4	5	6	7	8	9	10	11	MK	MR
1. Listening		.37**	.46**	.37**	.33**								
2. Writing			.55**	.45**	.40**					-.15*			
3. Reading				.65**	.51**	-.12*	.13*					.14*	.16**
4. Language Use					.37**	-.13*	.25**			-.15*			.18**
5. Speaking													
6. Extraversion							.13*	.13*	-.24**	.51**		.17**	
7. Conscientiousness								.31**	-.19**		-.16*	.28**	.37**
8. Agreeableness										.15**	-.21**	.23**	.27**
9. Neuroticism										.31**	-.15*		
10. Openness to Experience												.37**	.18**
11. Negative Valance													
12. MK													.71*

*** $p< .01$; * $p< .05$ (2-tailed)*

3.3. Predictive Power of Metacognition and Personality Traits on Foreign Language Reading and Language Use Performance

Multiple linear regression analyses were run to examine the predictive power of metacognition and personality traits on foreign language reading and language use performance scores. Although these two subsets of a foreign language could be tested in the same test, two different regression analyses were run to identify the effects of metacognition and personality traits on each domain separately for future uses. Moreover, because grammar was tested at the sentence level in this institution, the testing style impacted the author's choice of analyses even if she recognizes that grammar proficiency sets a ground for foreign language performance, including reading, speaking, listening, and writing. The models, including metacognitive components and personality traits for reading and language use, were significant. Predicted reading performance score was equal to 23.3 + .96 (Conscientiousness) -.87 (Extraversion) with ($F (2, 241) = 5\ p <.05$), with an R^2 of .033. Similarly, the language use model was significant ($F (2, 241)= 14.7, p <.05$), with an R^2 of .10. Predicted foreign language use performance score equaled to 9.6 + .81 (Conscientiousness) - .84 (Openness to Experience). While all predictors in the models were significant ($p <.05$), metacognitive components were left out.

3.4. Predictive Power of Personality Traits on Metacognition

Other multiple linear regression analyses were run to predict metacognitive knowledge and metacognitive regulation based on five personality traits by the previous findings. The results for metacognitive knowledge and metacognitive regulation models indicated significant regression equations ($F (3, 240) = 20.4, p <.05$), with an R^2 of .193 and ($F (2, 241) = 23.1, p <.05$), with an R^2 of .156, respectively. Predicted metacognitive knowledge was equal to 1.84 + .258 (Openness to Experience) + .135(Conscientiousness) + .099(Agreeableness) and predicted metacognitive regulation was equal to 2.08 + .214(Conscientiousness) + .157 (Openness to

Experience), respectively. All variables in these models were significant ($p < .05$). The following Figure 1) presents the paths among the variables.
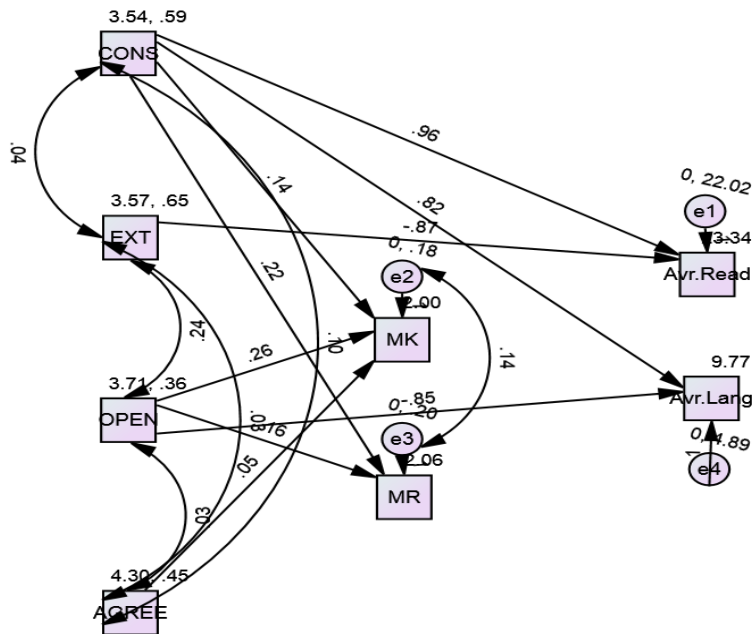

Figure 1. *Metacognition, Personality Traits, and Foreign Language Performance*

4. Discussion and Conclusions

Personality and metacognition are essential factors that need some exploration in educational settings, especially to understand variations in educational outcomes. As personality impacts the development of linguistic abilities (Ellis, 1985) and learners adopt different language learning strategies in harmony with their personalities (Brown, 2001), studying personality traits concerning language competencies can help recognize individual differences that were already brought to classrooms. Moreover, as a significant predictor and tool for learning, metacognition might be a byproduct of personality. This is because individuals tend to utilize learning approaches as their personality might partially determine them (Duff et al., 2004) or be a learnt component of their personality (Furnham et al., 1999). Understanding the interaction of these two components may help support learners' formal experiences in schools to the best.

This study examined the relation between metacognition and personality traits, and findings revealed that metacognition and personality traits are correlated. Some personality traits like Openness to Experience, Conscientiousness, and Agreeableness correlate with metacognition, positively. These findings, indeed, aligned with the previous findings, including Ayhan and Turkyilmaz's (2015), Fayyaz and Kamal's (2011), Fazeli's (2012), and Öz's (2016). However, most of these previous research studies operationalized metacognition as a single construct and studied its relation to personality traits. However, Flavell (1979) highlighted three components of metacognition in his theory; metacognitive knowledge, metacognitive regulation, and metacognitive experiences. Measurement instruments like Metacognitive Awareness Inventory (MAI) developed according to the theory assessing metacognitive knowledge and metacognitive regulation. In this study, as the theory proposes, metacognition's components were studied distinctively concerning personality traits. It was found that 20% of metacognitive knowledge can be explained by Openness to Experience, Conscientiousness, and Agreeableness, besides 16% of metacognitive regulation can be explained by Openness to Experience and Conscientiousness. The percentages calculated in this study were very close to the ones found by Fayyaz and Kamal (2011) and Fazeli (2012).

Regarding the characteristics of the personality traits identified in this study, metacognition can naturally emerge. When individuals are imaginative, creative, intellectually curious, and interested in attending to and processing complex stimuli (Openness to Experience) and when they are controlled against impulses, self-disciplined, organized, and goal-oriented (Conscientiousness) (Weisberg et al., 2011), they may perform metacognitive regulation. Also, beacuse the dominant characteristic of the participants pertained to trust,

cooperation or kindness (i.e., Agreeableness), they may tend to internalize instructional deliveries or utilize feedback without much hesitation. That is, learners might trust their teachers for their expertise, judgments, and feedback to modify their approaches to learning. Through such personality traits learners might already exercise metacognition; they can set goals, keep perseverance in knowledge seeking, think though, question, and experience trial-error, and utilize the directives and feedback from experts while managing tasks demands, achieving goals, or evaluating their learning.

Moreover, this study highlighted that metacognition might be over-showed by personality traits regarding foreign language reading performance. When foreign language performance was operationalized as district language skills, only reading scores were identified to be correlating with personality traits and metacognition. Regarding the definition of reading that pertains to meaning-making or comprehension building via cognitive and metacognitive skills (Ozturk, 2015), findings helped to confirm that reading is a strategic act; therefore, it involves highly conscious thinking. However, Kelly and Donaldson (2016) argued and seen in Figure 1, Conscientious readers might be already self-disciplined, organized, strategic, and goal-oriented and may employ metacognitive acts for reading. That is, this personality trait may mimic characteristics of metacognition. Moreover, it is essential to recognize that Extraversion negatively correlates and predicts foreign language reading performance, as Sanchez-Marin et al., (2001) found. Extraverts are outgoing, energetic, and enthusiastic (Fielden et al., 2015), and they tend to be assertive, highly active, and impulsive (Lucas & Diener, 2001). Regarding Lucas and Diener's (2001) mechanisms (i.e. conditionability, arousal level, and sensitivity to rewarding stimuli) proposed for this trait, it might be difficult or tedious for Extraverts to engage in such a cognitively demanding endeavor for an extended period.

Lastly, findings that pertained to foreign language use (grammar) performance were remarkable. The grammatical system of a language can be a significant dimension for foreign language learning as it helps learners comprehend and produce meaning in a new language. In this study, although language use performance scores correlated with metacognitive regulation, it was predicted significantly by Conscientiousness and Openness to Experience. Indeed, language use performance necessitates goal-oriented, organized, and self-disciplined learning experiences. On the other hand, internalization of grammar might not permit experimentation, imagination, or creativity as Openness to Experience has a negative predictive power. Foreign language learners cannot *play with or test* the grammatical system of a foreign language, especially in formal learning settings where proficiency tests determine their educational pathways. In the context of this study where grammar was tested at the sentence level, learners might be required to internalize *the rules as they are*. Therefore, they should be cautious about controlling and managing their use of grammatical rules as delivered via the instruction and assessed by the standardized tests.

4.1. Pedagogical Implications

Delivering metacognition instruction or developing learners' metacognition might sound easy or straightforward. However, as Veenman et al. (2006) argued that variations in individuals' competencies might be distinctive and metacognitive competencies might not develop, similarly (Ozturk, 2019). Before such training, conducting a needs-analysis study may be crucial to identify individual differences because they may create variations in learning outcomes, for example, mastery of metacognition. After identifying learners' characteristics, for example, personalities, learning styles, and competency with metacognition, it may be possible to create various metacognition training modules that will not force different people into learning the same way. In foreign language learning environments, educational outcomes might vary just because '*who you are*'; that is something to be considered carefully. For administration and teachers, it is essential to recognize and appreciate learners as they are. Instructional and assessment practices, therefore, needs adaptation for learners' characteristics, i.e., personality. As personality may determine how individuals act, institutions must know whom they teach to deliver instruction effectively and design fair assessment tools. When standardization punishes *some learners* or jeopardizes *their* learning opportunities just because who they are, we need to question and revise educational purposes.

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The Online Learning Academic Achievement of Chinese Students during the COVID-19 Pandemic: the Role of Self-Regulated Learning and Academic Entitlement

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ARTICLE INFO	ABSTRACT
	In the spring semester of 2020, all Chinese higher education institutions delivered courses online across the nation in response to the COVID-19. This study explores Chinese college students' self-regulated learning, academic entitlement, and academic achievement during the transitioning from face-to-face to online learning environments during this special time. Structure equation modeling was conducted, and results indicate that academic entitlement associates with students' online learning academic achievement. Whereas self-regulated learning does not relate to academic achievement in the online learning setting. Additionally, academic entitlement is marginally associated with academic achievement only among male students, while self-regulated learning is not a significant predictor for both genders. However, self-regulated learning is marginally linked with higher academic achievement among students who do not have previous online learning experiences but not among those who took online courses before.

1. Introduction

Online learning has been integrated but often used as a supplement to in-person teaching in universities in China (Sun et al., 2017; Tao et al., 2020). In response to the COVID-19 pandemic, Chinese higher education institutions moved to remote instruction during the spring semester of 2020. This was the first time that college courses were completely delivered online, and it was also the first time that a majority of Chinese college students took online courses formally. However, when learning online, students may face various challenges compared to learning in face-to-face courses. Furthermore, being quarantined at home while taking online courses, they would receive a feeling of isolation, which is identified as a major challenge for online learners (Rao et al., 2011). Although distance learning empowers students with more autonomy as to juggle their studies with other priorities, structure their learning process, and manage their time (Broadbent, 2017), online learning environments produce challenges associate with help-seeking and support among students with their instructors and peers (Kizilcec et al., 2017; Moore & Kearsley, 2005), and they need to be independent and self-regulated when studying online (Cho et al., 2010). Some researchers even noted that online learning would

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lead to low levels of cognition and dispositions for learning (Spitzer, 2012), fewer responsibilities, but stronger academic entitlement (Serdyukov, 2015). Therefore, it is important to understand online learners' experiences so as to support this learner group.

According to Rosenthal (2013), one of the major challenges in online education is not a technology issue but the lack of a solid research-based theoretical framework to support high-quality online learning. As a result, this study investigates Chinese college students' self-regulated learning, academic entitlement, and academic achievement during the transition from face-to-face to online learning environments, which has been less investigated. This empirical study is expected to contribute to the literature in an effort to elucidate the effect of self-regulated learning and academic achievement on students' academic achievement in online settings. Additionally, it is also hoped that this study would help Chinese higher education professionals to better understand Chinese college students' online learning experiences in order to provide corresponding support to improve distance education in China.

1.1. Literature Review

1.1.1. Self-Regulated Learning. Self-regulated learning is defined as "the self-directive processes and self-beliefs that enable learners to transform their mental abilities into an academic performance skill" (Zimmerman, 2008, p. 166). Self-regulated learning theory stemmed from cognitive psychology, with its origins backing to the social-cognitive learning theory of Albert Bandura. Bandura (1986) posited that human functioning involves a dynamic interplay among personal, behavioral, and environmental influences. In the conception of triadic reciprocality, personal variables such as cognitions and affects, behaviors, and environmental variables interact and influence one another (Bandura, 1986). That is, self-regulated learning is a reciprocal interaction of personal, environmental, and behavioral factors. To be specific, personal factors include individual self-efficacy, goal orientation, and metacognition. Environmental factors include instruction, peer learning, and help-seeking in an online learning context, while behavioral factor focuses on learning performance (Schraw et al., 2006). Scholars stated that self-regulated learning, as an active constructive process, involves goal-orientation, self-efficacy, self-control, motivation, cognitive strategy, and metacognitive self-regulation (Pintrich & Zusho, 2002). Therefore, self-regulated learners are usually self-motivated, using metacognitive learning strategies frequently, and report a high-level academic performance (Zimmerman & Martinez-Pons, 1986).

Furthermore, self-regulated learning requires the learner's continuous adjustment of cognitive activities and processes to adapt to a specific learning situation (Garcia & Pintrich, 1991). In other words, self-regulated learning is indicated as "highly context-dependent" (Zimmerman & Schunk, 2001, p.125). Compared with face-to-face course settings, the online learning context is more challenging in interacting with instructors and peers, as well as seeking immediate support, which demands higher levels of self-regulation (Cho et al., 2010). A lack of real-time communication with the instructors, along with the physical distance from school resources, may create academic challenges and emotional isolation (Bowers & Kumar, 2015). Meanwhile, being empowered with more autonomy, students are required to be independent and self-regulated in online learning environments in order to keep themselves cognitively engaged and motivated (McMahon & Oliver, 2001). A positive correlation between self-regulated learning and students' academic achievement was found (Puzziferro, 2008; Zimmerman & Schunk, 2001). However, if the self-regulated strategy consumes too many psychological resources, academic achievement will decrease (Li et al., 2011). While self-regulated learning is critical to success in one's future career, there remains a paucity of research into the effects of college students' academic entitlement on their motivation and metacognitive learning strategies. Thus, this study explores the influence of academic entitlement and self-regulated learning, indicated by academic goal orientations, self-efficacy, metacognitive self-regulation (Panadero, 2017, Zimmerman & Martinez-Pons, 1986), on student's academic achievement in an online learning context.

Academic Goal Orientations. Academic goal orientation refers to an individual's beliefs that reflect the reasons or purpose why they approach and engage in certain academic tasks (Eccles & Wigfield, 2002; Midgley et al., 2001; Pintrich, 2000). These goals provide meaning for students' efforts, connecting and adjusting their thoughts, motivation, emotions, and behaviors in their learning process (Midgley et al., 2001). Previous studies indicated that academic goal orientations have a significant relationship with students' academic achievement, adjustment, well-being, and engagement in their academic work (Anderman, 2015; Aspinwall & Taylor, 1997).

Studies exploring the relationship between students' academic goal orientations and their self-regulated learning revealed that those goal orientations were one of the important components of motivational self-regulated learning (Duncan & McKeachie, 2005). Additionally, a significant positive effect was found between students' academic goal orientations and their academic achievement (Sins et al., 2008). Moreover, students' academic goal orientations also positively impact their perception of the quality of learning in online learning environments (Kickul & Kickul, 2006).

Self-Efficacy. Self-Efficacy is considered as "the beliefs in one's capabilities to organize and execute the courses of action required to manage the prospective situation" (Bandura, 1977, p. 2), and it influences students' behaviors and learning achievements (Bandura, 1986). Students who feel more efficacious about their learning are more adaptive and engaged in self-regulated learning, work harder, have better persistence, persevere in the face of adversity, be more optimistic, have lower anxiety, hence have better academic achievements (Schunk & Pajares, 2004). In return, self-efficacy can be influenced by academic goal orientations, achievement, and environmental inputs such as feedback from the instructors and social comparisons with peers (Schunk & Usher, 2012). In other words, self-efficacy is contextualized to the activity and environment. Therefore, students' self-efficacy in online learning environments is different compared with their self-efficacy in face-to-face classes (Cho et al., 2010; Sun & Rueda, 2012). Specifically, self-efficacy can influence students' learning, achievement, motivation, and self-regulation in face-to-face settings (Schunk & Pajares, 2009; Schunk & Usher, 2012). However, studies have shown inconsistent results with the effect of self-efficacy on students' academic achievement in online learning environments. Some studies indicated that students with higher self-efficacy often have better academic online learning achievements (Joo et al., 2000; Wang et al., 2013). Whereas others argued that self-efficacy is not a strong predictor of academic achievement when students are taking online courses (DeTure, 2004; Puzziferro, 2008).

Metacognitive Self-Regulation. Metacognition was first defined by Flavell (1976) as "one's knowledge concerning one's own cognitive processes and products" (p. 232). In other words, metacognition refers to the awareness, knowledge, and control of cognition. Compared with cognition that focuses on learning skills and strategies, metacognitive self-regulation lies with the control and self-regulation aspects of metacognition (Pintrich, 1991). According to Kitsantas and Cleary (2016), metacognitive self-regulation includes planning, self-monitoring, and self-evaluating. Goal setting is an important aspect of planning activity for metacognitive self-regulation. Self-efficacy also predicts metacognitive self-regulation (Pajares, 2008). Additionally, metacognitive self-regulation can positively influence academic achievement as the awareness of self-monitoring of one's thinking can help develop understanding and problem solving (Rickey & Stacy, 2000). Therefore, metacognitive self-regulation is a significant component in the self-regulated learning construct (Baird & White, 1996), and it is closely related to self-efficacy, goal setting, and learning achievement. In learning environments, metacognitive self-regulation is a critical factor in motivating and engaging students on the ground that metacognition involves consciousness, monitoring, and control of an individual's learning. Scholars further noted that metacognition self-regulation could improve students' motivation and engagement in online learning environments (Ackerman et al., 2016), enhance students' confidence and coping strategies of performance (Bjork et al., 2013), as well as contributing to online learning interest and learning persistency (Tsai et al., 2018).

1.1.2.Academic Entitlement. Academic entitlement refers to the tendency that students feel entitled to special treatment (e.g., higher scores, extra credit, positive feedback, bending the rules for them, permission to turn in work late, immediate access to instructors or TA) regardless of the quality of their work, the actual progress they make, or the amount of effort they give (Kopp et al., 2011; Reinhardt, 2012). Some researchers stated that the current generation college students have higher levels of entitlement and incivility than previous generations (Chowning & Campbell, 2009; Kopp et al., 2011). It has been a common phenomenon that university faculty are beleaguered for higher grades by students who have not worked hard enough but feel they deserve better scores (Greenberger, 2008). Academic entitlement is related to a host of problematic traits in higher education, including consumer mentality (Singleton-Jackson et al., 2011), absence of personal effort (Boswell, 2012), external attributions for academic failures (Achacoso, 2002), academic dishonesty (Chowning & Campbell, 2009; Greenberger, 2008), and incivility or offensive behaviors to their professors (Knepp, 2016). Students with high academic entitlement tend to externalize responsibility and are not expected to have great confidence in academic achievement through internalized efforts (Boswell, 2012; Chowning & Campbell,

2009). Therefore, these students usually have lower self-efficacy and lower academic goal orientations (Boswell, 2012; Frey, 2015), which would then lead to lower self-regulation and poor academic achievement.

According to previous studies, students are liable to possess a greater sense of academic entitlement in online learning environments as the teacher-student relationship, assignments, and expectations are different compared to that of attending in-person classes (Greenberger et al., 2008). In addition, educators have a consensus that academic entitlement can impair learning in online contexts (Correa, 2010; Dziuban et al., 2007). However, limited study has been conducted to explore students' academic entitlement in online learning environments. Thus, it remains unclear regarding how and to which extent academic entitlement can influence students' academic achievement in online learning environments (Hazel et al., 2014).

1.1.3.The Current Study. The interaction between self-regulated learning and academic entitlement is important and would provide important guidance for interventions to enhance students' academic performance (McLellan & Jackson, 2017). However, mixed findings emerged from previous studies. For example, Achacoso (2002) divided academic entitlement into academic entitlement beliefs and academic entitlement actions. Achacoso (2002) further noted that academic entitlement beliefs are negatively related to some self-regulation strategies, whereas academic entitlement actions are positively related to self-regulation strategies. Kopp et al. (2011) found a positive relationship between academic entitlement and external regulation (actions are directed exclusively by rewards and punishment). However, McLellan and Jackson's (2017) research indicated that self-regulated learning is negatively related to academic entitlement. Thus, inconsistent results from previous studies and the potential short-circuit influence of academic entitlement on both self-regulation and academic achievement in higher educational settings call for more systematic study.

Further, neither academic entitlement's interfere with student learning nor the relation between the two constructs in the online context has been investigated. Both self-regulated learning and academic entitlement would influence students' successful learning. That is, skillful self-regulated learners usually have high academic performance, while students with high academic entitlement report low GPAs (Frey, 2015; Thibodeaux et al., 2017). There remains a paucity of studies, which examined self-regulated learning and academic entitlement on students' academic achievement, especially in the context of online learning. It is unknown whether self-regulated learning and academic entitlement are related to academic achievement in additive (cumulative) or overlapping (redundant) ways. Understanding this effect is significant as it would afford valuable information regarding the unique contribution of a particular variable and better understand the relative importance of self-regulated learning or academic entitlement in predicting students' academic achievement. Therefore, the purpose of this study is to explore Chinese college students' self-regulated learning, academic entitlement, and academic achievement during the transition from face-to-face to online learning environments. Research questions include:

1. Does self-regulated learning influence students' academic achievement in online learning environments after controlling the impact of academic entitlement?
2. Does academic entitlement influence students' academic achievement in online learning environments after controlling the impact of self-regulated learning?
3. Do the impact of self-regulated learning and academic entitlement on academic achievement differ in male and female students?
4. Do the impact of self-regulated learning and academic entitlement on academic achievement differ in students with previous online learning experiences and those without?

2. Methodology

2.1. Participants and Procedure

The present study examined an entire convenience sample of 395 college students at two large universities in China with 332 usable responses (usable rate equals 84%). Among them, 106 (31.9%) were male, 222 (66.9%) were female, and 4 (1.2%) did not report their gender. Additionally, 177 (53.3%) reported that they had an online learning experience before, while 150 (45.2%) identified themselves as new online learners, and 5 (1.5%) did not report their previous learning experiences.

The sample was collected in the spring semester of 2020 during the COVID-19 pandemic. Students were invited to participate in this study through a third party (the faculty members as gatekeepers) who work at two four-year research universities in Northeast and Southeast China. The survey was distributed through emails. Students took approximately 10-15 minutes to complete the anonymous and voluntary survey. No personal information was identified, and this study was approved by the Institutional Review Board (IRB).

2.2. Data Collection Instruments

The survey packet consisted of a brief demographic questionnaire, Achievement Goal Questionnaire (AGQ) (Elliot & McGregor, 2001), Self-Efficacy for Learning and Performance subscale from Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich, 1991), Metacognitive Self-Regulation subscale from MSLQ (Pintrich, 1991), and Academic Entitlement Questionnaire (AEQ) (Kopp et al., 2011).

2.2.1 Achievement Goal Questionnaire (AGQ)

The Achievement Goal Questionnaire (AGQ) (Elliot & McGregor, 2001) was used to assess students' mastery approach, mastery avoidance, performance approach, and performance-avoidance goal orientations. The AGQ is a 12-item 5-point Likert-type scale, ranging from 1 (strongly disagree) to 5 (strongly agree) (Example question "I desire to completely master the material presented in this class"). Higher scores indicate higher levels of achievement goal orientations. This study modified the 5-point Likert scale to a 7-point Likert scale to keep consistent with other questionnaires. AGQ (Elliot & McGregor, 2001) is with original internal consistency reliability Cronbach's alpha of .84, .88, .92, and .94 for four subscales and adequate reliabilities with the current sample (Cronbach's alpha of the four orientations were 0.87, 0.89, 0.92, and 0.83, respectively among subscales), indicating sufficient reliability of the scale.

2.2.2 Self-efficacy for learning and performance subscale from MSLQ

The Self-efficacy for learning and performance subscale (8 items) (Example question "I believe I will receive an excellent grade in this class") was derived from Pintrich's (1991) Motivated Strategies for Learning Questionnaire (MSLQ) with a 7-point Likert scale from 1 (not at all true of me) to 7 (very true of me). The original internal consistency reliability of Cronbach's alpha was .93. The Cronbach's alpha with the current sample was .90, indicating adequate reliability of the measure.

2.2.3 Metacognitive self-regulation subscale from MSLQ

The metacognitive self-regulation subscale (12 items) (Example question "I ask myself questions to make sure I understand the material I have been studying in this class") was also derived from Pintrich's (1991) Motivated Strategies for Learning Questionnaire (MSLQ) with a 7-point Likert scale from 1 (not at all true of me) to 7 (very true of me). The original internal consistency reliability of Cronbach's alpha was .79, respectively. The Cronbach's alpha with the current sample was .82, indicating adequate reliability of the measure.

2.2.4 Academic entitlement was evaluated using the Academic Entitlement Questionnaire (AEQ)

The Academic entitlement was evaluated using the Academic Entitlement Questionnaire (AEQ) (Kopp et al., 2011). The AEQ is an 8-item 7-point Likert-type scale from 1 (strongly disagree) to 7 (strongly agree) (Example question "If I don't do well on a test, the professor should make tests easier or curve the grades"). The original internal consistency reliability Cronbach's alpha was reported as 0.81 and 0.84 for two student samples (Kopp et al., 2011). The Cronbach's alpha with the present sample was .89, indicating the scores measured were reliable.

Finally, academic achievement was measured using students' final grades of an online compulsory English course.

2.3. Analysis of Data

The original items were in English and translated into Chinese. To guarantee the validity of the Chinese version of the measure, a standard translation and back-translation procedure was used (Hambleton & Patsula, 1998). Descriptive statistics and correlations among all study variables were conducted in SPSS (Version 27.0). To answer the first and second research questions, the impact of self-regulated learning and academic entitlement on students' academic achievement in online learning environments, Path Analysis of Structural Equation Model was fitted in AMOS (Arbuckle, 2012). Full information maximum likelihood

estimation was used to handle missing data. Latent variables for self-regulated learning, using scale scores for goal orientation, academic self-efficacy, and metacognitive self-regulation (values of rs ranged from .41 to .63, ps < .001). The metacognitive self-regulation subscale set the metric for the latent variable, self-regulated learning. Model fits were assessed by the χ^2 statistics, Comparative Fit Index (CFI), and root mean square error of approximation (RMSEA). A good model fit is indicated by the p-value of $\chi^2 > 0.05$, CFI > 0.90, RMSEA < 0.08 (Kline, 2015).

To answer the 3rd research question, whether the impact of self-regulated learning and academic entitlement on students' academic achievement differ in male and female students, separate path analyses were conducted for male and female samples. Similarly, to answer the 4th research question, separate analyses were conducted for students with and without previous online learning experience.

3. Findings

Descriptive statistics and correlations among all study variables are presented in Table 1. Goal orientation, self-efficacy, and metacognitive self-regulation are positively correlated (rs ranged from .41 to .63, ps < .001). Academic entitlement and academic achievement are negatively correlated (r = -.15, p < .05). It is worth mentioning that academic entitlement was not significantly correlated with goal orientation, self-efficacy, and metacognitive self-regulation. Male students reported a lower level of metacognitive self-regulation and academic entitlement but with a higher level of academic achievement than female students. Students who had previous online learning experiences reported high self-efficacy.

Table 1. *Correlation and Descriptive Statistics*

	1	2	3	4	5	6	7	8
1. Gender	-							
2. Age	.17**	-						
3. Previous online learning	.03	-.01	-					
4. Goal orientation	-.05	-.10	.04	-				
5. Self-efficacy	-.07	.03	.12*	.41***	-			
6. Metacognitive self-regulation	-.14**	.01	-.06	.54***	.63***	-		
7. Academic entitlement	-.20***	-.12*	.03	.08	.04	.08	-	
8. Academic achievement	.43***	.01	.02	.04	.03	-.02	-.15*	-
M (SD)/%	66.9%	19.72 (.96)	54.1%	5.13 (.86)	4.74 (.95)	4.85 (.74)	3.20 (1.13)	3.49 (.70)

Note. Gender was coded as 0 = Female and 1 = Male; *p < .05; **p < .01; ***p < .001

Figure 1 shows the results of self-regulated learning and academic entitlement on academic achievement. The standardized path coefficients are presented. The model is a good fit to the data, χ^2 (5) = 4.263, p < .005; χ^2/df = .85; Comparative Fit Index (CFI) = 1.00; Root Mean Square Error of Approximation (RMSEA) = .00. Consistent with expectations, academic entitlement (B = -.09, SE = .04, p < .05) predicted academic achievement. In other words, the lower level of academic entitlement, the better academic achievement, whereas the higher level of academic entitlement, the worse academic achievement. No significant associations were found between self-regulated learning and academic achievement.

Next, to examine whether the effect of self-regulated learning and academic entitlement on academic achievement differ in males and females, separate path analyses were conducted. Results reveal that academic entitlement is marginally associated with lower academic achievement among male students (B = -.13, SE = .07, p < .10) but not female students. Self-regulated learning is not a significant predictor for either gender. Similar analyses were conducted for participants who have had online learning experience or not, and the result indicates that self-regulated learning is marginally associated with higher academic achievement among students who had no previous online learning experience (B = 22, SE = .13, p < .10) but not for the student who had a previous online learning experience. Finally, academic entitlement is not a significant predictor.
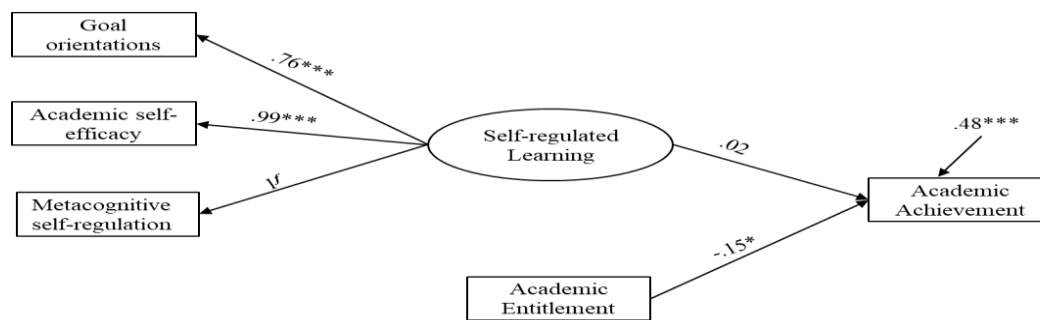
Note. ᶠ= fixed path; Covariates were included in the model: gender, age, and previous online learning experience (not shown). Standardized coefficients are provided. *p < .05

Figure 1. *Exanimation of the association of self-regulated learning and academic entitlement on academic achievement.*

4. Conclusion and Discussion

The current study examines self-regulated learning, academic entitlement, and academic achievement among Chinese college students who took formal online courses during the COVID-19 pandemic for the first time. The results reveal that academic entitlement is associated with academic achievement. This finding aligns with previous conclusions that academic entitlement is negatively associated with student learning due to its instrumental focus (e.g., Kopp et al., 2011; Page & Alexitch, 2003). Additionally, results note that academic entitlement is marginally linked to lower academic achievement only among male students, which argues with Blincoe and Garris' (2017) statement that female students often report higher levels of academic entitlement. Meanwhile, this finding supports Ciani and colleagues' (2008) results that male students express higher levels of academic entitlement, and that relationship has not changed over time.

Additionally, results show that self-regulated learning is not a significant predictor of academic achievement. This finding echoes with Broadbent and Poon's (2015) conclusions that the effect of self-regulated learning on students' academic achievement in face-to-face settings appears to generalize to the online context, nevertheless, the effects become weaker, less effective, and unexplored factors may be more important in online learning environments. Finally, results indicate that self-regulated learning is marginally associated with higher academic achievement among students who do not previously take online courses but not among those who have a previous online learning experience. In other words, having online learning experiences would eliminate the effect of self-regulated learning on academic achievement. That is, experienced online learners' self-regulation has less influence on academic achievement.

Based on the findings, three aspects are highlighted to improve students' online learning achievement, including mitigating academic entitlement, developing an online learning experience, and supporting self-regulated learning. Researchers proposed approaches to abate academic entitlement on college students. For example, Zhu et al. (2019) used role theory and message framing to impact students' grade negotiation behavior in face-to-face course settings. It would be applicable in online learning environments, as well. Specifically, role theory aims to influence students' behavior by changing their perceived roles. The academic entitlement of students who view their roles as academic trainees would be different compared to those who view themselves as paying customers (Zhu & Anagondahalli, 2017). Singleton-Jackson et al. (2010) stated that only when students' cognitive shift from consumers to scholars occurs, then higher education will not be a business. Meanwhile, message framing impacts student enactment of roles as customers or students (Zhu et al., 2019). Therefore, students' academic entitlement can be mitigated by the role theory and framing of education.

The online learning experience is another crucial factor that influences students' academic achievement, especially for Chinese college students in this study, as 45.2% of them have not had previous online learning experiences. Therefore, it is important for schools to make online learning available and accessible to more college students. Additionally, Chinese higher education institutions should also develop online learning management systems and provide technical assistance to increase students' online learning experiences and course engagement. Self-regulated learning is correlated with online learning achievement for inexperienced online learners. Hence, it is important to improve learning achievement through supporting self-regulated learning for online course beginners. Self-regulated learning can also be improved through various strategies

such as goal setting, strategic planning, self-efficacy, self-monitoring, self-evaluation, and adaptive inferences (Kitsantas & Cleary, 2016). Therefore, involving these factors would help students adjust their learning strategies to improve their academic achievement for online learning.

5. Limitations

Several limitations exist in the present study. First, 91.3% of the participants were freshmen and sophomores. 31.9% of participants were male, and 66.9% were female. There might be potential validity issues for generalization to the whole college student population. Future studies should take into consideration more junior and senior college students. Second, this study recruited participants from universities located in a well-developed province of China. Future studies should be conducted in less developed provinces so as to indicate more comprehensive conclusions. Additionally, this study was conducted during the COVID-19 pandemic period. All universities in China had to switch to online learning with no exception. Therefore, students may lack sufficient readiness and willingness to participate in online learning, which would impact their academic entitlement and self-efficacy, especially when the pandemic itself has resulted in the sense of disconnectedness and increased isolation in online learning environments. Hence, we suggest more post-pandemic studies. Last, because it was the first time that nationwide online teaching was implemented, some technical issues remain in terms of using a learning management system, which may additionally influence students' online learning experiences. They probably need more time to develop their adaptiveness and self-regulated skills in such an online learning context. Therefore, more empirical-based and longitudinal studies are needed.

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An Investigation into the Development of the Force and Energy Unit through STEM Integration in Science Course and its Effects on Students' Critical Thinking Skills

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ABSTRACT

In this study, to examine the change in individuals' critical thinking skills, a new unit was developed in which STEM was integrated. The outcomes of this 7th-grade unit were selected from related disciplines. During the learning process of the developed Force and Energy unit, it was aimed that individuals could make judgments by gaining critical thinking skills and evaluate events in a multi-dimensional way. In this study, which lasted for five weeks, the developed unit was used to conduct lessons with the experimental group (N=25) while the control group (N=25) was traditionally taught. The Critical Thinking Scales developed by Demir (2006a) were used in the research process. Before the implementation, no significant difference was found between the experimental and control groups regarding critical thinking skills, but after the implementation, a significant difference was observed in favour of the experimental group. When the scores obtained from the sub-scales (interpretation and explanation) were compared, a significant difference was found in favour of the experimental group. When the changes in the experimental and control groups were examined, there was no significant change in the control group students, but a significant change was found in favour of the experimental group. These changes occurred in the evaluation, Interpretation, and explanation sub-scales of the critical thinking scale. Based on these data, it can be said that the critical thinking skills of individuals who receive STEM education improve. Accordingly, making use of different disciplines simultaneously while designing a product in STEM education is an important factor in the development of individuals' critical thinking skills. Thus, teachers should carry out this process effectively.

1. Introduction

The current era is a period in which scientific knowledge and technology advance at an extraordinary pace. It is crucial to transfer the theoretical structure of knowledge to daily life and to realize its practical applications. In this period, individuals will develop their 21st-century skills and thus contribute to the future (Çınar et al., 2016). Wagner (2008), who is in contact with various organizations to raise individuals with 21st-century skills, states that seven skills, including critical thinking skills, came to the fore. According to Demir (2006b), individuals should blend the information with their own thoughts by filtering them through criticism before accepting it as it is, and critical thinking is significant in realizing this process. Kökdemir (2003) advocates that

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individuals with high critical thinking skills use reasoning when making decisions about a situation, while individuals with low critical thinking skills make cursory decisions. It can be stated that a good critical thinker is open-minded, reliable, knowledgeable, questioning decisions, overcoming prejudices, acting fairly, prudently, and willing to rethink to have definite conclusions on an issue (Facione, 1990). Therefore, studies should be conducted in line with this purpose to raise ideal critical thinking individuals. Şenşekerci and Bilgin (2008) argue that individuals' critical thinking skills can be improved through education, warning that this skill should be acquired from an early age.

To train individuals with 21st-century skills, a new learning model was needed in which different disciplines were learned in conjunction with each other and transferred to daily life. In this context, STEM (Science-Technology-Engineering-Mathematics) education has emerged, which creates a multi-discipline by bringing together related disciplines and aims to gain new skills by enabling individuals to look at facts and events from a broader perspective. In STEM education, while individuals design for the solution of daily life problems, they collect information by conducting situation analysis, reveal new ideas by brainstorming, develop a prototype based on these ideas and test whether the prototype developed for the solution of the existing problem works according to the specified criteria (NGSS, 2013; NRC, 2012). Therefore, individuals who receive STEM education take an active part in this process and consider different factors by establishing interdisciplinary relationships, so they gain the ability to think multi-faceted. Also, STEM education helps individuals to have the experience of solving real-life problems in cooperation and find an ideal environment for them to develop solutions to their daily life problems.

As in many countries, for the solution of current and future possible problems, STEM education attracts attention from the business world and is considered essential by the Ministry of Education in our country. Since the business world finds the profile of qualified people in 21st-century skills, it considers STEM education. For example, TUSIAD (2014) states that a more qualified education will be initiated by this means. In the STEM education report published by MEB (2016), STEM education is seen as an interdisciplinary approach covering a large part of the learning process. MEB (2018a) has established the Science, Engineering and Entrepreneurship Practices Directive in the updated Science Curriculum and declared that the subjects should be linked with each other in line with this directive. Accordingly, the science textbooks were renewed in line with the updated Science Curriculum and Directive (2018a), but they were found incompatible with STEM education; thus, it was concluded that they had deficiencies in teaching 21st-century skills (Bahar et al., 2018; Çetin, 2020; Özbilen, 2018; Tezcan, 2019). Some activities in the updated Science textbooks do not have the characteristics of STEM education, and the number of activities related to STEM education is not sufficient (Tozlu et al., 2019). Therefore, in this research, a new "Force and Energy" unit with the integration of STEM education has been developed, considering the gains in the 7th Grade Force and Energy unit in the MEB's (2018) Science, Technology and Design, Mathematics Curriculum.

For individuals to realize meaningful learning, it is ideal for creating a program by establishing connections between different disciplines and associating them with daily life problems (Yıldırım & Altun, 2015). In the updated Science Curriculum, MEB (2018a) emphasizes acting with an interdisciplinary perspective based on research and inquiry-based learning. In Mathematics Curriculum, MEB (2018b) states to establish a connection with daily life and associate it with other lessons for this purpose. In the Information Technologies and Software Curriculum, MEB (2018c) underlines that in the progress of the products and projects to be developed, the relevant problems and solutions should be from real life and in this direction should be associated with other courses. In Technology Design Curriculum, MEB (2018d) emphasizes that it is necessary to cooperate with many disciplines, especially the Science course, so STEM-based implementations should be carried out. Therefore, STEM education that attracts attention today emerges based on teaching the disciplines of Science-Technology-Engineering-Mathematics by integrating them (Gülhan & Şahin, 2016). In STEM education, there is an environment in which different disciplines are learned in conjunction with each other at the same, time and there is an approach that considers more than one discipline while making designs for the solution of a problem. Bahadır (2018) advocates that Mathematics courses should not be seen as a collection of arithmetic operations, and implementations should be made by establishing connections with real-life and different disciplines. In another discipline (Technology education), it is said that a multi-disciplinary curriculum will help individuals to comprehend the interconnections of subjects in the learning process

(Wicklein & Schell, 1995). As interdisciplinary relationships increase, individuals will be able to make judgments and evaluate events in a multi-dimensional way by gaining critical thinking skills (Bahadır, 2018). In this context, educating individuals from an early age with an interdisciplinary perspective may contribute to the development of their critical thinking skills. This is because studies conducted with different disciplines will develop students' critical thinking (Wicklein & Schell, 1995).

In the tenth and eleventh development plans prepared by the T.R. Ministry of Development (2013) and the T.R. Presidency Strategy and Budget Office (2019), respectively, competencies, such as developing individuals' thinking skills, developing correct perception and ability to solve the problems encountered, have been determined as basic education objectives. In this context, as a research question, it was determined whether the Force and Energy unit developed by integrating STEM at the 7th-grade level had an effect on individuals' critical thinking skills.

2. Method

2.1. Research Model

In the quasi-experimental design, two of the available groups are determined and matched over various variables (Büyüköztürk et al., 2018). This research was a quasi-experimental design using pre-test and post-test. After the pre-test, the 7th grade Force and Energy Unit developed by the researcher with STEM integration was applied to the experimental group by another teacher for five weeks. Also, the control group was instructed by the same teacher.

2.2. Study Group

The process was carried out with the typical case sampling approach. For the implementation to be performed by a different teacher, a volunteer teacher was sought in a social communication network group consisting of about 60 science teachers in the Istanbul Kartal district and three volunteer teachers (one working in a private school and two working in public schools) were reached. Interviews were conducted with teachers working at public schools since the study primarily targeted students studying in public schools. This is because in a typical case sampling, the aim is to determine an average sample that is not extraordinary in the relevant universe (Büyüköztürk et al., 2018). Since one of the volunteer teachers was working in the public school, he did not approve the idea of doing a different teaching practice for the experimental group. Therefore, the other Science teacher working in the public school was determined as the practitioner and it was thought that the students studying at this school would represent the relevant universe better since the socio-economic levels of the families were at a medium level. In Turkey's STEM Education Report (2015), female students were stated to be less interested in STEM fields. Thus, the attention was especially paid to female students who have low interest in engineering (Ganesh et al., 2009; Knight & Cunningham, 2004). In the relevant sample school, male and female students were studying in separate classes. Two 7th classes (each consisting of 25 students) of female students who had equal academic achievements were determined. The experimental group students were randomly determined. To examine whether they had similar academic achievements, their grand point average scores of 6th grade were considered. First, normality analysis was performed.

Table 1. *Normality Test of Students' Grand Point Average Scores*

Variables	N	Skewness	Std.	Kurtosis	Std.
Group 1	25	-.256	.464	-.252	.902
Group 2	25	-.079	.464		.902

As is seen in Table 1, students showed a normal distribution. That the Skewness coefficient is between "-1 and +1" is an important step for a normal distribution (Büyüköztürk, 2017). Besides, the Kolmogorov-Smirnov test is performed if the number of students in the group is greater than 50, and if the number of students is less than 50, the Shapiro-Wilks test is used to examine whether the scores show a normal distribution (Büyüköztürk, 2017).

Since the number was less than 50, the Shapiro-Wilk test data in Table 2 were examined. Based on the results (p> .05), a t-test (one of the parametric tests) was used.

Table 2. *Normality Test of Students' Grand Point Average Scores*

Variables	Kolmogorov-Smirnov Z	p	Shapiro-Wilk Z	p
Group 1	.106	.200*	.974	.745
Group 2	.105	.200*	.968	.605

Also, the value of Levene's test, which is seen as a normality assumption, was investigated for variance equality. The data at the bottom of the sig. (2. tailed) value was presented in Table 3. Considering the data in Table 3 it was observed that there was no significant difference between the grand point average scores of 6th grade (p> .05). Thus, one of the two classes was determined as the experimental group and the other class was considered as the control group.

Table 3. *T-Test Results of Students' Grand Point Average Scores according to Groups*

Groups	N	$\overline{X}$	S	sd	t	p
Group1	25	75.05	8.13	48	-.976	.334
Group2	25	77.77	11.28			

2.3. Force and Energy Unit Development Process

During the process of developing the Force and Energy unit, MEB Science Curriculum (2018a), Middle School Mathematics Curriculum (2018b) and Technology and Design Lesson Curriculum (2018c) were examined in detail and common outcomes related to Force and Energy unit were determined. In the same period, the outcomes related to critical thinking skills in the Outcome-Centered STEM Applications published by the MEB General Directorate of Private Education Institutions (2019) were included in the developed unit.

The Force and Energy unit consisted of five sections, and scenarios were created in each section by establishing a connection with daily life. In the production process of these scenarios, the aim was for individuals to be inspired by nature while designing products. This is because many engineering products are designed with inspiration from nature. The first part of the developed unit included the concepts of mass and weight, and at the end of this section, individuals were asked to design a Hovercraft prototype. The second part involved the concept of physical work, and at the end of this part, individuals were required to design a Pull-Drop Work Vehicle prototype. The third part included the concepts of kinetic and gravitational potential energy. At the end of this chapter, individuals were asked to design a parachute prototype. In the fourth part, the concept of elastic potential energy was included, and in this chapter, individuals were required to design a Wind-Up Flying Vehicle prototype. In the last part, conservation of energy, kinetic energy loss by friction and air/water resistance concepts were included. At the end of this section, individuals were asked to design a Rocket prototype. In addition, in the design process of all products, limitations and success criteria were determined and individuals were asked to pay attention to these issues.

The engineering design process in 'Engineering is Elementary (2013) Program' was taken as the basis for the design of the products in the Force and Energy unit. In the Ask Questions, which is the first stage, it was aimed for individuals to obtain information about the product to be designed. In the Imagine stage, individuals tried to find solutions for product design using the brainstorming technique. In the Plan stage, it was aimed that individuals plan the actions to be carried out step by step, draw the product prototype in two dimensions and provide the necessary tools and materials. In the Create Product stage, individuals should follow the planned actions to turn the design into a product and determine whether the product works in accordance with the previously foreseen limitation and success criteria. In the Develop Product stage, individuals should pay attention to what works and what does not work efficiently in the developed product prototype. Also, individuals are required to make changes and retest them in order for the product to work more efficiently.

During the development of the Force and Energy unit, the opinions and suggestions of two field experts who researched STEM education were taken. In addition, the unit was examined by two Turkish language teachers to ensure the integrity of language and meaning. Then, the necessary arrangements were made.

2.4. Implementation Process

MEB (2018a) has determined five weeks for teaching the 7th grade Force and Energy unit in the Science Curriculum. In this context, the application period of the Force and Energy unit, which was developed with STEM Integration, was also set as the same period and applications were initiated with the experimental group

students. During the implementation process, one week was allocated to each section, and students in the experimental group were asked to research outside of school as well. The out-of-school processes of the students gained significance in terms of supplying the necessary materials in the product design process and conducting research-development activities.

The 7th grade Science Textbook was used to teach students in the control group so that they could gain the outcomes underlined in the MEB Science Curriculum (2018a). The activities in the 7th Grade Science Textbook mostly consisted of activities aimed to learn the concepts in the Force and Energy unit, and the aim was to have students design a paper airplane at the end of the unit in an activity titled Science, Engineering and Entrepreneurship Applications. This design application is not sufficient for STEM education.

The applications submitted with the experimental and control groups were performed with the same teacher in similar classroom environments and for the same period. The experimental group was working on the Force and Energy unit developed with STEM Integration, while the control group was working on the Force and Energy unit in the Science Textbook.

Besides, the Force and Energy unit was piloted by the researcher with a different group of 7th-grade students. Thus, the necessary arrangements were made and the negativities that could be experienced during the implementation process were prevented.

2.5. Data Collection Tools

The Critical Thinking Scale (CTS) developed by Demir (2006a) was used to investigate whether there was a change in students' critical thinking skills during the research process. CTS consists of six sub-scales such as analysis, evaluation, inference, interpretation, explanation and self-regulation. While developing Analysis, Evaluation, and Inference sub-scales of CTS, Demir (2006b) performed test-retest with 201 students for three weeks, examined the double-serial correlation and Pearson correlation coefficients, and removed five items with low correlation. Considering the Pearson correlation values, he found .708 for the analysis sub-scale, .855 for the evaluation sub-scale, and .696 for the inference sub-scale. During the development of interpretation and explanation sub-scales, as the scales consisted of multiple-choice tests, he continued to work with the same students and examined the item difficulty and item discrimination indexes. Based on the data, he removed only one item from the explanation sub-scale and determined that the test items had moderate strength and a high level of discrimination. He also examined the KR-20 values to reveal the reliability coefficients and found .759 for the interpretation sub-scale and .768 for the explanation sub-scale. A test having .70 and above value is considered sufficient for the reliability of the test scores (Büyüköztürk, 2017). During the development of the self-regulation scale, which was designed as a Likert-type scale, he studied with the same students. The factor loads of the self-regulation sub-scale were examined and four items were removed from the scale due to the low factor loading of four items. The Cronbach's alpha value of the self-regulation sub-scale, which consists of twelve items in the final version, was also revealed as .91. Thus, the Critical Thinking Scale consisting of 56 items was developed.

3. Data Analysis

In this study, the change in individuals' critical thinking skills both within and between groups was analysed according to the scores obtained before and after the implementation.

3.1. Scores of the Critical Thinking Scale Obtained before Implementation

During the process of examining the critical thinking skills of students in the experimental and control group before the implementation, normality analysis was first performed.

As is seen in Table 4, a kurtosis value of ± 1.0 is considered perfect for most psychometric purposes, but a value between ± 2.0 can also be accepted depending on the specific implementations (George & Mallery, 2012).

Table 4. *Normality Test of Students' CTS Scores before the Implementation*

Pre-implementation of the Critical Thinking Scale	Groups	N	Skewness	Std.	Kurtosis	Std.
Analysis Sub-scale	Control Group	25	.048	.464	-.018	.902
	Experimental Group	25	-.897	.464	1.271	.902
Evaluation Sub-scale	Control Group	25	-.043	.464	-.810	.902
	Experimental Group	25	.014	.464	-1.891	.902
Inference Sub-scale	Control Group	25	-.448	.464	-.653	.902
	Experimental Group	25	-.240	.464	-1.356	.902
Interpretation Sub-scale	Control Group	25	-.916	.464	1.026	.902
	Experimental Group	25	-970	.464	1.641	.902
Description Sub-scale	Control Group	25	-1.286	.464	1.955	.902
	Experimental Group	25	-1.592	.464	2.401	.902
Self-Regulation Sub-scale	Control Group	25	-.688	.464	.420	.902
	Experimental Group	25	-.665	.464	1.186	.902
Critical Thinking Sub-scale	Control Group	25	-.270	.464	-.535	.902
	Experimental Group	25	-.365	.464	-.180	.902

Table 5. *Normality Test of Students' CTS Scores before the Implementation*

Variables	Kolmogorov-Smirnov Z	p	Shapiro-Wilk Z	p
Control Group	.094	.200	.974	.754
Experimental Group	.091	.200	.976	.800

According to the Kolmogorov-Smirnov test data in Table 5, it was decided that it would be appropriate to use an independent t-test, which is a parametric test, because of p> .05.

Table 6. *Pre-Implementation Independent T-Test Results of the Students' Scores according to Groups*

Scale	Groups	N	$\bar{X}$	S	sd	t	p
Analysis Sub-scale	Control Group	25	6.4000	1.04083	48	-.244	.808
	Experimental Group	25	6.4800	1.26227			
Evaluation Sub-scale	Control Group	25	6.4000	1.84842	48	.563	.576
	Experimental Group	25	6.0400	2.60576			
Inference Sub-scale	Control Group	25	5.2400	1.92094	48	.445	.658
	Experimental Group	25	5.0000	1.89297			
Interpretation Sub-scale	Control Group	25	8.0000	1.77951	48	-.609	.546
	Experimental Group	25	8.2800	1.45831			
Description Sub-scale	Control Group	25	7.4400	1.19304	48	-.500	.619
	Experimental Group	25	7.6400	1.60416			
Self-Regulation Sub-scale	Control Group	25	15.5200	2.55147	48	-1.716	.093
	Experimental Group	25	16.8800	3.03205			
Critical Thinking Scale	Control Group	25	49.0000	5.93015	48	-.755	.454
	Experimental Group	25	50.3200	6.42080			

Table 6 displays that there was no significant difference between the control and experimental groups regarding critical thinking skills (p> .05). Thus, it can be said that students of both groups had close critical thinking skills before the implementation.

3.2. Scores Received from the Critical Thinking Scale after the Implementation

During the process of examining the critical thinking skills of the experimental and control group after the implementation, normality analysis was first performed.

Table 7. *Normality Test of Students' CTS Scores after the Implementation*

Post-implementation of the Critical Thinking Scale	Groups	N	Skewness	Std.	Kurtosis	Std.
Analysis Sub-scale	Control Group	25	.193	.464	-1.222	.902
	Experimental Group	25	-1.104	.464	2.214	.902
Evaluation Sub-scale	Control Group	25	-.355	.464	-1.270	.902
	Experimental Group	25	-.600	.464	-.555	.902
Inference Sub-scale	Control Group	25	.195	.464	-.679	.902
	Experimental Group	25	-.847	.464	1.707	.902
Interpretation Sub-scale	Control Group	25	-1.641	.464	4.180	.902
	Experimental Group	25	-2.127	.464	3.539	.902
Description Sub-scale	Control Group	25	-1.454	.464	2.114	.902
	Experimental Group	25	*		*	
Self-Regulation Sub-scale	Control Group	25	-.446	.464	-.968	.902
	Experimental Group	25	.256	.464	-1.167	.902
Critical Thinking Scale	Control Group	25	-.955	.464	.192	.902
	Experimental Group	25	-.920	.464	.989	.902

*Since the whole students in the experimental group answered all the questions in the Explanation sub-scale correctly, there was no skewness and kurtosis value.

Considering the whole set of Critical Thinking Scale, the fact that the coefficient of skewness was between "-1 and +1" indicates that it is a normal distribution (Büyüköztürk, 2017). At the same time, since the number of students in the group was 50, the Kolmogorov-Smirnov test was examined to see if it showed a normal distribution (Büyüköztürk, 2017).

Table 8. *Normality Test of Students' CTS Scores after the Implementation*

Variables	Kolmogorov-Smirnov Z	P	Shapiro-Wilk Z	P
Control Group	.155	.122	.904	.023
Experimental Group	.108	.200	.925	.065

Considering the Kolmogorov-Smirnov test data in Table 8, it was decided that it would be appropriate to use an independent t-test, which is a parametric test, because of p> .05.

Table 9. *Post-Implementation Independent T-Test Results of the Students' Scores according to Groups*

Scale	Groups	N	$\overline{X}$	S	sd	t	p
Analysis Sub-scale	Control Group	25	6.6000	1.0408	48	-.376	.708
	Experimental Group	25	6.7200	1.2083			
Evaluation Sub-scale	Control Group	25	6.6400	1.7530	48	-.388	.699
	Experimental Group	25	6.8400	1.8859			
Inference Sub-scale	Control Group	25	5.1600	1.4910	48	-.379	.706
	Experimental Group	25	5.3200	1.4922			
Interpretation Sub-scale	Control Group	25	8.3200	1.8645	48	-3.566	.001
	Experimental Group	25	9.7200	.61373			
Description Sub-scale	Control Group	25	7.4800	1.8284	48	-4.156	.000
	Experimental Group	25	9.0000	.00000			
Self-Regulation Sub-scale	Control Group	25	16.5600	2.6153	48	-.244	.809
	Experimental Group	25	16.7600	3.1659			
Critical Thinking Scale	Control Group	25	50.7600	6.1932	48	-2.122	.039
	Experimental Group	25	54,3600	5,7942			

Table 9 presents that there was a significant difference (p< .05) between the overall scores of the Critical Thinking Scale in favour of the experimental group. Besides, there was a significant difference (p< .05) between the scores obtained from the Interpretation and Explanation sub-scales of the Critical Thinking Scale in favour of the experimental group.

3.3. Scores of the Control Group Received from the Critical Thinking Scale before and after the Implementation

While examining the changes in the critical thinking skills of the control group before and after the implementation, normality analysis was first performed. The normality analysis was examined by considering the difference between the pre-implementation and post-implementation CTS scores of the control group.

Table 10. *Normality Test of CTS Scores of Students in Control Group before and after the Implementation*

Critical Thinking Scale	Group	N	Skewness	Std.	Kurtosis	Std.
Difference of Analysis Scores	Control Group	25	-.119	.464	-.277	.902
Difference of Evaluation Scores	Control Group	25	-.099	.464	-.594	.902
Difference of Inference Scores	Control Group	25	.016	.464	-.280	.902
Difference of Interpretation Scores	Control Group	25	.636	.464	3.871	.902
Difference of Explanation Scores	Control Group	25	-.824	.464	2.305	.902
Difference of Self-regulation Scores	Control Group	25	-.337	.464	-.080	.902
Difference of Critical Thinking Scores	Control Group	25	-.086	.464	-.281	.902

When Kurtosis and Skewness values are between -1.5 and +1.5, it is accepted to be normal distribution (Tabachnick & Fidell, 2013). In the same vein, a kurtosis value of ± 1.0 is considered perfect for most psychometric purposes, but a value between ± 2.0 can be accepted depending on a specific implementation (George & Mallery, 2012). According to Table 10, the scores of the control group obtained before and after the implementation showed a normal distribution. Therefore, a dependent t-test was applied to examine whether there was a significant difference between the scores.

Table 11. *Pre- and Post-Implementation Dependent T-Test Results of the Students' Scores in Control Group*

Critical Thinking Scale	Control Groups	N	$\overline{X}$	S	sd	t	p
Analysis Scores	Pre-Test	25	6.4000	1.04083	24	-.679	.503
	Post-Test	25	6.6000	1.04083			
Evaluation Scores	Pre-Test	25	6.4000	1.84842	24	-.586	.563
	Post-Test	25	6.6400	1.75309			
Inference Scores	Pre-Test	25	5.2400	1.92094	24	.175	.863
	Post-Test	25	5.1600	1.49108			
Interpretation Scores	Pre-Test	25	8.0000	1.77951	24	-.736	.469
	Post-Test	25	8.3200	1.86458			
Explanation Scores	Pre-Test	25	7.4400	1.19304	24	-.108	.915
	Post-Test	25	7.4800	1.82848			
Self-Regulation Scores	Pre-Test	25	15.5200	2.55147	24	-1.87	.073
	Post-Test	25	16.5600	2.61534			
Critical Thinking Scores	Pre-Test	25	49.0000	5.93015	24	-1.45	.160
	Post-Test	25	50.7600	6.19328			

Table 11 indicates that there was no significant difference (p> .05) in the critical thinking skills of students in the control group. This can be interpreted that the students in the control group had similar critical thinking skills before and after the implementation.

3.4. Scores of the Experimental Group Received from the Critical Thinking Scale before and after the Implementation

While examining the experimental group students' critical thinking skills before and after the implementation, normality analysis was first performed. The normality analysis was examined by considering the difference between the pre-implementation and post-implementation CTS scores of the experimental group.

When Kurtosis and Skewness values are between -1.5 and +1.5, it is accepted to be a normal distribution (Tabachnick & Fidell, 2013). At the same time, a kurtosis value of ± 1.0 is considered perfect for most psychometric purposes, but a value between ± 2.0 can be accepted depending on a specific implementation (George & Mallery, 2012). According to Table 11, the scores of the experimental group obtained before and

after the implementation showed a normal distribution. Therefore, a dependent t-test was applied to examine whether there was a significant difference between the scores.

Table 12. Normality Test of CTS Scores of Students in Experimental Group before and after the Implementation

Critical Thinking Scale	Group	N	Skewness	Std.	Kurtosis	Std.
Difference of Analysis Scores	Experimental Group	25	,666	,464	-,311	,902
Difference of Evaluation Scores	Experimental Group	25	,417	,464	,028	,902
Difference of Inference Scores	Experimental Group	25	-,171	,464	-,548	,902
Difference of Interpretation Scores	Experimental Group	25	1,085	,464	1,214	,902
Difference of Explanation Scores	Experimental Group	25	1,592	,464	2,401	,902
Difference of Self-Regulation Scores	Experimental Group	25	-,107	,464	-,790	,902
Difference of Critical Thinking Scores	Experimental Group	25	,514	,464	-,632	,902

Table 13. *Pre- and Post-Implementation Dependent T-Test Results of the Students' Scores in Experimental Group*

Critical Thinking Scale	Experimental Groups	N	$\overline{X}$	S	sd	t	p
Analysis Scores	Pre-Test	25	6.4800	1.2622	24	-1.238	.228
	Post-Test	25	6.7200	1.2083			
Evaluation Scores	Pre-Test	25	6.0400	2.6057	24	-2.219	.036
	Post-Test	25	6.8400	1.8859			
Inference Scores	Pre-Test	25	5.0000	1.8929	24	-.927	.363
	Post-Test	25	5.3200	1.4922			
Interpretation Scores	Pre-Test	25	8.2800	1.4583	24	-5.566	.000
	Post-Test	25	9.7200	.6137			
Explanation Scores	Pre-Test	25	7.6400	1.6041	24	-4.239	.000
	Post-Test	25	9.0000	.0000			
Self-Regulation Scores	Pre-Test	25	16.8800	3.0320	24	.188	.853
	Post-Test	25	16.7600	3.1659			
Critical Thinking Scores	Pre-Test	25	50.3200	6.4208	24	-4.858	.000
	Post-Test	25	54.3600	5.7942			

As is seen in Table 13, there was a significant difference (p< .05) in the critical thinking skills of the students in the experimental group. Thus, it can be stated that there was a difference between the critical thinking skills of the students in the experimental group before and after the implementation. Also, a significant difference (p< .05) was found between the scores obtained from the Evaluation, Interpretation and Explanation sub-scales before and after the implementation.

4. Discussion, Conclusion and Recommendations

This study examined the effects of the Force and Energy Unit (in which STEM was integrated) on the critical thinking skills of 7th-grade students in the Science Course. Before the implementation, the data obtained from CTS were examined to investigate whether there was a significant difference between the experimental and control groups regarding critical thinking skills. No significant difference was found between groups (p> .05). After a five-week implementation, data were reanalysed, and a significant difference was observed in favour of the experimental group (p< .05). When the scores obtained from the sub-scales (Interpretation and Explanation) were compared, a significant difference was found in favour of the experimental group (p> .05). The scores that participants got before and after the CTS were examined to identify the changes that occurred during the process. Accordingly, while there was a significant difference in the experimental group (p>.05), there was no significant difference in the control group (p<.05). Besides, a significant difference was found (p< .05) between the scores obtained by the experimental group from the Evaluation, Interpretation and Explanation sub-scales before and after the implementation. The experimental group students' handling of the claims and arguments in the information sources in the process of acquiring theoretical information about product design may contribute to developing assessment skills. Also, while solving the problems presented in the scenarios, students' understanding and describing the problem and attaching significance to revealing the most ideal design may improve their interpretation skills. Besides, Individuals may develop their

explanation skills by presenting arguments for product design to impose their ideas on their friends, following the engineering design process and a certain procedure, and expressing the results by looking at how effectively the products they created work or did not work. To improve the analysis, inference and self-regulation skills of individuals, it may be effective to introduce new product designs. To achieve this situation, larger time is needed in the implementation process.

These results coincide with the results of Rehmat (2015), who examined the effect of problem-based STEM activities on critical thinking skills of primary school students. In his study with 7th-grade students, Topsakal (2018) determined that individuals' critical thinking dispositions increased with problem-based STEM activities. In their studies with 8th-grade students by integrating the disciplines of Mathematics and Science, Elliott et al. (2001) found that an interdisciplinary approach is effective in the development of individuals' critical thinking skills. This research finding indicates that individuals who receive STEM education have improved their critical thinking skills. When the literature is examined, there is a dearth of studies on STEM education and the development of critical thinking skills. In STEM education, some situations (e.g., in-group discussions during the research and prototype development process for the solution of the problem, and the evaluation of the draft prototypes that individuals put forward individually during the modelling process) can contribute to the development of the experimental group's critical thinking skills. In their study with 6th-grade students, Bakırcı and Çepni (2016) stated that activities, such as in-group discussions and peer-assessment, are among the factors that enable the development of critical thinking skills. Based on these data, it can be said that STEM education improves critical thinking skills.

In STEM education, while individuals design products to solve related problems, they benefit from different disciplines simultaneously. This will support the development of critical thinking skills by contributing to individuals' multi-directional thinking over time. In this process, individuals can quickly turn to the prototype of the product they are designing without necessary scientific research (Ercan & Şahin, 2015). If teachers can manage this process, which is considered significant for the development of individuals' critical thinking skills, a meaningful change may occur in individuals. Besides, increasing the number of units with STEM integration for all students will contribute to developing their critical thinking skills.

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Investigating the Variable of Spiritual Inclination's Moderating Effect between Teachers' Perceived Stress Levels and Common Anxieties

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ARTICLE INFO	ABSTRACT
	This research aims to examine in the context of the structural equation model the moderating effect of spiritual orientation on the relationship between the situation of common anxiety and the levels of perceived stress in individuals who teach at different types of schools. Similarly, addressing teachers' perceived stress levels, common anxieties, and spiritual orientations in the context of various demographic variables is an aim of the present study. The research universe included teachers working at various school levels in the 2018-2019 school year in the Anatolian side of the Province of Istanbul. The research sample consisted of 268 teachers from different school levels. Data were obtained using scales for perceived stress, common anxiety, and spiritual orientation and a form on demographic information. In line with the aims of this research, Pearson product-moment correlation analysis and path analysis were used. As a result of the analysis, it was concluded that the variables of stress and anxiety were in a negative and significant relationship with the variable of spiritual orientation (r1=-.305; r2=-.227; p<.001). As a result of the path analysis, spiritual orientation was seen to have a moderating effect on the relationship between perceived stress and common anxiety. The research has been discussed and finalized in light of the literature. Click or tap here to enter text.

1. Introduction

Teaching is a crucial profession on the points of both responsibilities and the expectations of the family, society, and nation. Teachers, who have an important function in raising generations, are likely to be stressed from time to time and experience anxiety as a result of this stress. Examining the effects of spirituality on minimizing this situation and addressing them in the context of study care quite important. In this respect, this study examines the relationship between the stress levels and anxieties that teachers perceive.

1.1. Stress

Stress is an important situation that undoubtedly affects human life negatively. Having this situation be extreme can cause other discomforts to appear in individuals. However, not all stress can be said to be harmful. In fact, Selye (1976) stated that stress could consist of two states: the first of these is beneficial and the second is harmful. According to him, harmful stress causes serious problems to appear in a person as a result of oppression, while beneficial stress contributes to providing an individual with harmony.

Lazarus and Folkman (1984) defined stress as environmental demands in person-environment interaction that jeopardize the individual's harmony and forcing or exceeding available resources. This word comes originally from the Latin word *estrictia*. Back then, it was known to be used more in the sense of trouble or curse (Baltaş

& Baltaş, 1998, p. 298). Ellison (1990) addressed stress as a biochemical response gıven in the face of threats. Stress is a force capable of leading to depression and troubles in a person as a result of various problems (Başaran, 1992). According to Ajala (2013), problems, such as stress and burnout, can be solved with spirituality and contribute to the well-being of employees

Stress is a condition that individuals encounter in all areas of life. Organisms can show resistance at a certain rate against this situation and can absorb it. In some cases, however, individuals do not confront the stress and are forced to face the negative consequences this situation brings. Burger (2006) emphasized that various negative outcomes emerge as a result of the intense pressure of stress. Faulkner (2010) stated that permanent problems can occur if an individual is exposed to long-term stress. Therefore, reducing the sources of stress as much as possible and eliminating the situations that cause stress have great importance in terms of individual psychological health. This is because being able to completely eliminate permanent problems or being able to reduce their effects requires serious effort and time. In fact, Eren (2000) emphasized in the study he did that stress causes serious physiological disorders, such as high blood pressure, shortness of breath, upset stomach, nerve pain, sleep disorders, fatigue, and extreme sensitivity. However, it is expected that teachers, who are constantly in contact with students, parents, and administrators, experience various stress situations. Kyriacou (2001) stated that due to the difficulties of the teaching profession and situations, such as anger, anxiety, stress, and depression, may arise. Hartney (2008) stated that the reason for this is the differences in students' motivation and learning levels. Kim et al. (2020) on the basis of the stress experienced by teachers; expressed as low wages, problems with parents, impossibilities in regions with low socioeconomic levels, and crowded classes. Therefore, it is seen as a result of research that the teaching profession contains various stress situations.

1.2. Spirituality

Humans, who arise from different situations with respect to their physiological, psychological, and spiritual structure, are as peaceful as much as they can face these different situations. Therefore, addressing the human only through physiological needs is insufficient and erroneous. In fact, people have spiritual needs alongside physiological needs. Spirituality is a general expression of these needs. The concept of spirituality has been kept away from the field of psychology for a long time through the impact of modernity because the emergence of psychology as a science began in Europe and America. That is why the domination over psychology as been mostly Western-sourced. At the time when psychology emerged as a science, materialism was known to have a significant effect (Schultz & Schultz, 2001, p. 81). Similarly, behaviorism also gave no value to mental and spiritual processes and saw no need to deal with these phenomena (Haque, 2001). In time, people began to be accepted not as a machine or robot but on the contrary as having various feelings and thoughts. The emergence of schools that gave importance to cognitive processes was effective in this (Pinker, 2003). Concepts that had been ignored since before this period began to be studied and slowly found their own place within the literature on psychology. Spirituality, one of these concepts, has gained particular importance recently. Studies done particularly in this field have been printed and published by reputable magazines and journals. In fact, performed studies show a positive relationship to exist between spirituality and psychological well-being (Pargament, 1997). The concept of spirituality has generally been used in the historical process in the same sense as the concept of religion (Shafranske & Sperry, 2007). However, the equal meaningfulness between spirituality and religion has been differentiated recently. This is because while spirituality is expressed as the experiences a person has individually, religion has been defined as following teachings that are more accepted.

1.3. Anxiety

A situation of thinking internal, apprehensive, troubling, concerning, or bad things will happen without a clear cause is called anxiety (Nolen-Hoeksema, 2009). Emotions of this type, rather than being temporary, are ongoing responses in the face of more prolonged and spontaneous dangers. Although mild symptoms appear, various states of panic and advanced levels of concern can also be seen. Öztürk and Uluşahin (2011) stated that ın the case of anxiety, situations could also be seen, such as accelerated heart rate, stomach aches, tightness in the muscles, and emotional feelings of fear. At the same time, exaggerated perceptions of danger and unrealistic beliefs are also seen on the issue of what bad things can happen. One of the most-seen disorders in some societies is anxiety. In a study done by Kessler et al. (2010), the lifetime incidence of anxiety disorders

was found to be 29%. This case shows how high anxiety is in some societies. Öztürk and Uluşahin (2011) stated in their study that anxiety usually starts at an early age, with 10-25 years old being the riskiest period. Similarly, Sareen et al. (2011) found in the study they conducted that people with low income and women have higher rates of anxiety. Anxiety is a condition that can be seen in every person. Therefore, teachers who have executive positions in the education and training process are also likely to bear various concerns. That teachers can become stressed is a known fact, especially while preparing classes or reviewing students' learning outcomes. In cases of prolonged stress are the situations where anxiety occurs. Consequently, spirituality is considered to have a high-level reducing effect on the cases of anxiety experienced by teachers who conduct educational and teaching activities experience in a stressful environment.

1.4. Present Study

This study aims to fill a gap in the literature by examining the moderator effect of the spiritual orientation variable on the relationship between perceived stress and general anxiety of individuals teaching at different levels. In general, various studies have been conducted on teachers' stress and anxiety (Bayramoğlu et al. 2020; Göçen, 2019; Keoh, 2002; Kırımoğlu et al. 2011; Nart & Batur, 2014). Although various studies have been conducted to determine teachers' stress and anxiety levels, to our knowledge, there is no study examining the moderator effect of spiritual orientation on the relationship between teachers' perceived stress and general anxiety. Therefore, it can be said that this study is the first study on this subject. Thus, it is tested whether spiritual orientation has an effect on reducing the stress that occurs in teachers from turning into anxiety. The effects of the spiritual orientation variable on stress and anxiety are examined. There are two assumptions in this study. First, perceived stress negatively affects general anxiety. Second, spiritual orientation reduces the negative association between perceived stress and general anxiety. The second assumption is the main aim of this study. Figure 1 shows the main hypothesis of this research.
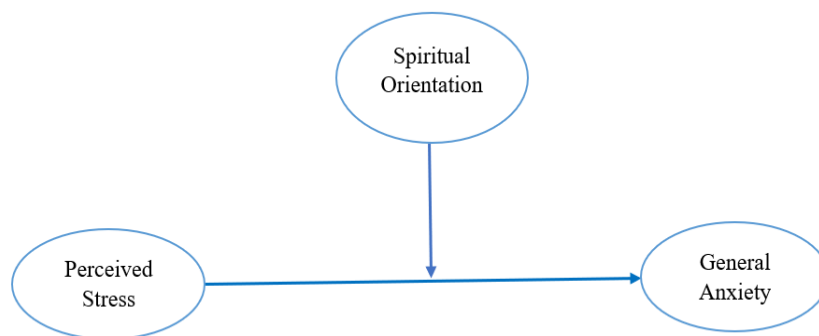
Figure 1. *The Hypothetical Model Related to The Goal of The Research.*

2. Method

2.1. Research Model

This research investigated the relationships the various variables had with each other with the relational screening model to speculate about the goal for testing the direct and indirect effects among these variables. To achieve this goal, a structural equation model (SEM) was used.

2.2. Study Group

Because reaching the general universe in this research was troublesome, the working universe of the study was used. In this direction, the working universe of the research included teachers employed in various schools on the Anatolian side of the province of Istanbul in the spring semester of the 2018-2019 school year. While determining the sample size of the present research, the sample size was calculated as n = 360 with a sampling error of ±5% at a 95% confidence interval for the non-homogenous structure of the universe (Salant & Dillman, 1994). To be able to increase the representative percentage of the sample, a sufficient number of samples was determined as 300 people by considering possible data losses. The sample group of the research was formed of teachers selected at random using the proportional convenience sampling method from the schools that formed the universe of this study. This study, in which 287 people participated, continued after eliminating the scales that had been inadequately filled in using the answers from 268 teachers in total, 172

women (64.2%) and 96 men (35.8%). Of these teachers, 13 (4.9%) are employed in kindergartens, 100 (37.3%) in primary schools, 92 (34.3%) in middle schools, and 63 (23.5%) in high schools.

2.3. Data Collection Tools

2.3.1. The Perceived Stress Scale. The Perceived Stress Scale (PSS) was developed by Cohen, Kamarck, and Mermelstein (1983). The Turkish adaptation was performed by Eskin, Harlak, Demirkıran, and Dereboy (2013). The PSS, which consists of 14 items, has been designed for the purpose of determining what kind of stress people perceive from situations in their life. The scale is a 5-point Likert type, and participants can receive scores for each item ranging from "Never" (0 points) to "Very often" (4 points). Seven of the items (Items 4, 5, 6, 7, 9, 10, & 13) are reverse scored. Fourteen items are found on the long form (PSS-14), and 4 or 10 items are found on the short forms (PSS-4 and PSS-10). While the PSS-14 scores range from 0-56, PSS-10 scores range from 0-40, and PSS-4 scores range from 0-16. The higher the score a person obtains shows that person to have higher levels of stress.

2.3.2. Spiritual Orientation Scale. This was developed by Kasapoğlu (2015) for the purpose of evaluating individuals' spiritual orientation. As a result of the performed validity and reliability studies, a scale consisting of 16 items and one dimension has been obtained. The scale has been prepared as a 7-point Likert type where 1 = I completely disagree and 7 = I completely agree. The scale has no reverse-scored items. The lowest obtainable score on the scale is 16 and the highest is 112. The overall score indicates the degree of spiritual orientation. The result has been reached showing the single-factor, 16-item model that emerged as a result of the exploratory and confirmatory factor analyses to have an adequate level of compliance. The fit indexes were examined as a result of the confirmatory factor analysis, and the chi-square value has been found to be significant (χ^2 = 239.718, SD = 100, p = .000). Additionally, the fit indexes are acceptable (χ^2 / SD = 2.39 is less than 3, $RMSEA$ = 0.06, RMR = 0.05, GFI = 0.93, $AGFI$ = 0.90, CFI = 0.95, IFI = 0.95, NFI = 0.92) and have emerged with good fit. The scale has been determined to form from one factor that explains 47.50% of the total variance, and the fit indices of the model represented by one dimension are suitable. The scale's reliability study was tested using Cronbach's alpha and test-retest reliability coefficients. The alpha coefficient has been found as .87 and the test-retest reliability coefficient as r = .84 (Kasapoğlu, 2015).

2.3.3. Generalized Anxiety Disorder Test-7 (GAD-7). GAD-7 is a short test from Spitzer et al. (2006) that measures general anxiety disorder by considering the DSM-IV-TR criteria. The scale is a measuring tool developed as a 4-point Likert type formed of seven items that asks people about the situations they experienced in the last two weeks. The scale was adapted to Turkish by Konkan et al. (2013). The score obtainable for each item ranges from "Never" (0 points) to "Almost every day" (3 points). The scale's breakpoints have been identified as light (5 points), moderate (10 points), and serious (15 points). Investigating the GAD-diagnosis of participants with a total score of 10 or higher is believed necessary. When selecting the total score threshold as 10, the sensitivity for GAD diagnosis was 89% and the specificity to be 82%.

2.4. Data Analysis

To make the necessary analyses with the data obtained within the scope of this research, the data must meet some assumptions. The most important of these is whether the data can provide normality values. Within the scope of this research, data were collected from 287 teachers. However, 19 data were not included in the analysis due to the incomplete filling of some data and the systematic incorrect filling of some data. Outliers were also included in these extracted data. Before proceeding to the analyses, normality tests were performed for the variables. According to the results of the normality tests, it was concluded that the data were normally distributed and the analysis was started. The results regarding this are shown in Table 1 in the findings section. This study aimed to analyze examine the positive moderator effect of spiritual orientation on the relationship between stress and anxiety of teachers working in different branches. The scales collected data after the necessary permissions had been obtained from the owners. In analyzing the data, Pearson product-moment correlation analysis was used first with the help of the package program SPSS 22.0, then later the package program AMOS 20.0 was used for testing the structural equation model. Path analysis is a collection of statistical techniques that allow the possibility for testing the causal and one-way relationship sequences that are predicted in relation to the variables (Tabachnick & Fidell, 2015).

3. Findings

The prerequisite analyses were performed concerning the reliability of this study before moving on to the main analyses that form the basic hypothesis of this research. In this context, the average scores of the participants appearing in this research obtained from the scales that were used, the standard deviations, Cronbach's alpha values, skewness, kurtosis values and Kolmogorov Smirnov results are shown in Table 1. When examining the Cronbach's alpha values for the reliability of the scales used in this research as seen in Table 1, the obtained results show the scales and their sub-dimensions to possess sufficient reliability values (Büyüköztürk, 2015). Likewise, these results confirm the assumption that the data are normally distributed.

Table 1. *The Mean, Standard Deviation, and Cronbach Alpha Values from the Scores the Sample Obtained from the Scales*

Variables	N	X	SD	Cronbach's Alpha	Kolmogorov Smirnov	Skewness	Kurtosis
1.Perceived Stress	268	36.33	9.274	.787	.050	-.347	-.043
2.Spiritual Orientation	268	83.31	20.795	.982	.053	.678	.997
3.General Anxiety	268	13.46	4.454	.904	.125	.760	-.272

Pearson moment-product correlation was performed for the purpose of determining the intensity and direction of the relationships among the variables that took place within the scope of the research, and the analysis results are presented in Table 2. Various conditions must be met to be able to test the moderating effect, which is the main purpose of this study. Cohen and Cohen (1983) described these conditions as follows: A moderating effect is expected to either strengthen or weaken the relationship of the variable or variables with the dependent and independent variables. The correlation values in Table 2 have been interpreted in consideration of the preconditions.

Table 2. *The Correlation for the Study's Variables*

Variables	Perceived Stress	Spirituality	General Anxiety
Perceived Stress	1	-0.305*	.589*
Spiritual Orientation	-0.305*	1	-0.227*
General Anxiety	.589*	-0.227*	1

*$p < .001$

The correlation values must be appropriate to be able to perform analyses on the moderating effect of the variable of spiritual orientation on the relationship of perceived stress and generalized stress, which is the main purpose of the study. When looking at the relationship among the variables of perceived stress, spirituality, and generalized anxiety, all the variables are seen in the table to have a significant relationship. Similarly, spiritual orientation, which is considered the moderating variable, is also seen to have a significant relationship with the other two variables as a result of the analyses. Therefore, the process will continue with analyzing the moderating effect of spirituality, which is considered the moderating variable. In the context of these data, the model passed to the testing phase. The findings related to the model are presented in Figure 2.

Figure 2. *Analyzing The Moderating Effect of The Variable of Spiritual Orientation an The Relationship Between Perceived Stress and Generalized Anxiety*

As a result of the analyses performed for the purpose of examining the variable of spiritual orientation's moderating effect on the relationship between perceived stress and generalized anxiety, the relationship between stress and anxiety was found as $r_1 = .589$ when the variable of spiritual orientation was not added together. This case meant the variable of perceived stress predicted generalized anxiety at the rate of 34.7%. When the variable of spiritual orientation was added as the moderator to the relationship between these two variables, perceived stress and generalized anxiety were seen to significantly reduce ($r_2 = .519$, $p < .05$). However, the total amount of perceived stress and spirituality were found to account for generalized anxiety was 36.6%. According to the results obtained from these analyses, spiritual orientation significantly reduced the relationship between the stress levels teachers perceived and their generalized anxiety. The results regarding the model are presented in Table 3.

Table 3. *Moderator Effect Analysis Results*

		Coeff.	SE	t	P
Constant	i$_Y$	74.26	9.78	7.19	.000
Perceived Stress (X)	b$_1$	.59	.19	5.53	.000
General Anxiety (W)	b$_2$	2.94	.54	4,96	,000
Perceived Stres × Spiritual Orientation (XW)	b$_3$	,10	,07	3,57	,009
Model : R^2 =36.6, MSE = 74.88, F (33. 93), p <.05					

When Table 3 is examined, it is seen that the moderator effect of the spiritual orientation variable is significant in the relationship between perceived stress and general anxiety (p< .05). According to this result, spiritual orientation reduces teachers' perceived stress levels and significantly prevents the formation of general anxiety. The findings regarding this result are presented in Figure 3.

1Blue line = Low-level spirituality; 2Green line = Medium-level spirituality; 3Yellow line = High-level spirituality
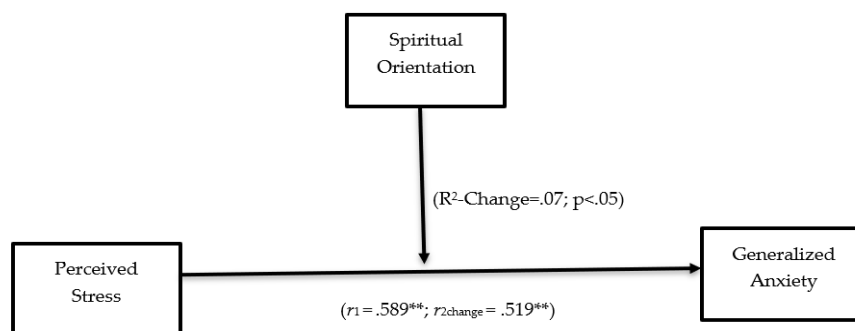
Figure 3. *Graph Regarding The Moderating Effect of The Variable of Spiritual Orientation on The Relationship Between Perceived Stress and Generalized Anxiety.*

When examining Figure 3, the relationship between teachers' perceived stress levels and generalized anxieties is seen to be directly proportional at a high level (blue line). When testing the moderating effect of spirituality, a reduction is again understood from the figure in the relationship between perceived stress and generalized anxiety states (yellow line). If said another way, spiritual orientation decreases the intensity of the relationship between perceived stress levels and anxiety.

4. Discussion

The research findings are discussed in this section. In examining the literature, although studies are seen to have addressed the relationship between perceived stress levels and generalized anxiety, to our knowledge, no study is reached where the moderating effect of the variable of spiritual orientation on the relationship between these two variables was examined in the context of a sample of teachers. Therefore, this research is considered to be an original case to fill this gap. The results related to this research have been supported and discussed through existing studies that have been conducted over the variables.

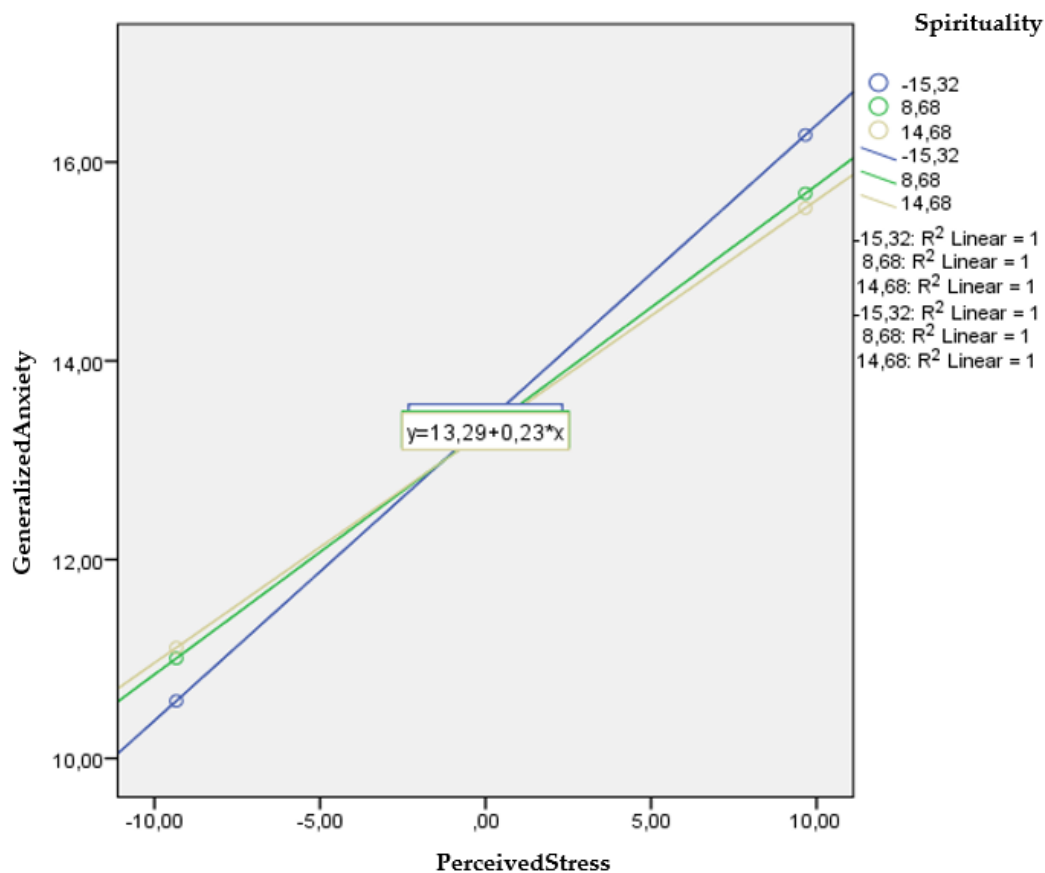This research has examined the moderating effect of the variable of spiritual orientation on the relationship between teachers' perceived stress and generalized anxieties. Before proceeding with the analyses, whether or not the obtained data were appropriate for such a study was looking at, and the result emerged that the data were appropriate for this research. Each scale's internal consistency value was examined, and this coefficient was had a value at the acceptable level for all scales (Cronbach's α > .70; Büyüköztürk, 2015).

Discussions began related to the moderating effect of spiritual orientation, which forms the main purpose of this study. In analyzing the correlation values among the variables used in the scope of this research, a positive and significant relationship (r = .589; p < .001) has been found between perceived stress and generalized anxiety, a negative and significant relationship (r = -0.305; p < .001) between perceived stress and spiritual orientation, and a negative and significant relationship (r = -0.227; p < .001) between generalized anxiety and spiritual orientation. According to these results, generalized anxiety also increases with increases in perceived stress. Spirituality decreases with increases in perceived stress. Spirituality decreases with increases in generalized anxiety. When examining the literature, studies are seen to have investigated the relationships that exist among these variables together. Sarıçam, Şahin and Soyuçok (2015) in their study arrived at a result similar to our study on the relationship between stress and anxiety (r = .57). McLaughlin and Hatzenbuehler (2009) arrived at the result in their study that stress increases anxiety. According to the results obtained from various studies (Robinson & Alloy, 2008; Watkins, 2008), ruminating (thinking repeatedly) on the effects that stressful events have on anxiety is shown to have significant effects. Similarly, stress cases that occur in life are also known to increase anxiety. Watkins (2008) stated the effects of focusing on repetitive thoughts to be under the reasons that stress causes anxiety. Therefore, the ruminations that form as a result of stress can become a trigger for psychological disorders, such as anxiety (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008; Reiss, 1991). Brown (1993) stated that an intense relationship exists between stressful situations and anxiety. Meanwhile, research results are seen related to health where stressful situations are also the cause for long-term anxiety (Repetti, Taylor, & Seeman, 2002). Therefore, stress is conclusively the trigger or instigator of anxiety and similar disorders.

One of the other important purposes of this study is examining whether or not the variable of spiritual orientation has a moderating effect in reducing the intensity of the relationship between perceived stress and generalized anxiety. As a result of the analyses, spiritual orientation is seen to significantly decrease the inter-relationships. Again obtained as a result of the analyses, spirituality has a negative relationship with stress and anxiety. The research on examining the effects of religion/spirituality on mental health can be said to have increased in recent times. König et al. (2001) stated that religious/spiritual states have a positive effect on mental health problems. Similar discoveries can be seen in the study of Batson et al. (1993). Again, some studies have reached the result that the rate of depression and anxiety is lower in people who are more religious or spiritual (König et al., 1998). Likewise, the result has arrived at that religiousness, and spirituality have an inverse relationship with anxiety and depression disorders (Braam et al. 2001). Sperry (2003) stated that an ongoing search exists for therapies that will address clients' concerns. Miller and Thoresen (2003) stated spirituality to have good aspects toward psychological problems and even physical problems.

5. Limitations and Future Research Directions

Some limitations should be considered when interpreting the results obtained from this study. First of all, since this study is quantitative, it does not allow us to make causal inferences about the results of the relationships between the variables. Thus, it would be useful to conduct qualitative studies in which the research results are questioned with justification. Second, the data from this study are limited to teachers working in public schools only. For this reason, it would be beneficial to conduct similar studies with teachers working in the private sector. Third, in this study, we examined the moderating effect of spiritual orientation on the relationship between perceived stress and general anxiety. However, this study can be designed to include different variables. This quantitative study shows the positive effects of spiritual orientation in general. Conducting qualitative studies examining the causes of these will carry the results of this study to a different dimension. Also, the main purpose of the research examined the moderating effect of the variable of spiritual orientation on the relationship between perceived stress and generalized anxiety, and spiritual orientation's moderating effect on reducing the relationship between stress and anxiety has been obtained as a result of the analyses. This result shows spiritual orientation to be effective at reducing stress and anxiety. Therefore, the following recommendations can be presented to researchers regarding the results of this study:

- This research has been conducted with examining the moderating effect of spiritual orientation on the relationship between stress and anxiety. Performing studies in which different variables are also tested would enrich the literature on this topic.

- This research has been performed with teachers. More comprehensive studies that will be performed with different segments of society are considered able to provide useful information.

- Doing psychological training with spiritually-oriented content would be beneficial for seeing in more detail the effect spiritual orientation has on stress and anxiety.

- Qualitative research can be performed that investigates the causes underlying how spirituality reduces stress and anxiety.

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Profiles of Academic Procrastination in Higher Education: A Cross-Cultural Study Using Latent Profile Analysis

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ARTICLE INFO	ABSTRACT
	Procrastination behaviour occurs when the person is obligated to do an activity, even they are not motivated to carry out the activity within the expected time frame. Literature studies define four types of procrastination: academic, decisional, life routines, and neurotic. This study focuses on academic procrastination in higher education. Academic procrastination is mainly related to delaying academic tasks such as handing in assignments and term papers or preparing for the exams at the last moment. This study compares Turkish and international students' academic and general procrastination profiles using latent profile analysis. For this purpose, latent profiles were estimated to reveal how students from different cultures are grouped according to academic and general procrastination behaviour. A total of 691 undergraduate students, 52.4% (361) Turkish and 47.6% (330) of international students registered for an academic program in higher education participated in the study. Results indicated that while Turkish students for three latent profiles defined as Tending to enjoyable Works, Neither Lessons nor Other Works and Ambition for Academic Success. On the other hand, International students only fit two latent profiles, which are defined as Academic Procrastination Tending to Enjoyable Works and Prioritizing Academic Tasks. Keywords: Latent profile analysis, procrastination, cross-cultural

1. Introduction

The definition of procrastination behaviour is that although the person knows that he/she should do an activity, they are not motivated to carry out the activity within the expected time frame, unnecessarily delay starting work until they feel uncomfortable and anxious (Rothblum, et al.., 1986; Senécal, et al., 1995; Solomon & Rothblum, 1984). Procrastination refers to adjourning unpleasant tasks to do them later. However, as a result, the activities enjoyed by them are missed, and the price paid by disrupting the healthy lifestyle becomes high (O'Donoghue & Rabin, 2001). In addition, individuals who procrastinate, unnecessarily delaying the works or activities, may have internal and external problems such as anger and regret, disappointment, self-condemnation, and hopelessness due to their inability to use their capacities fully. Besides all these internal experiences, a person may face negative external consequences such as receiving a small fine for late payment (Burka & Yuen, 2008).

Classifying related to procrastination behaviour seems possible. Milgram et al. (1992) and Milgram and Tenne (2000) mentioned four types of procrastination: academic, decisional, life routines, and neurotic/compulsive postponement. *Academic procrastination* is defined as delaying academic tasks such as handing in assignments and term papers or preparing for the exams at the last moment. *Decisional procrastination* is defined as not

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being able to decide in time. *Procrastination* of life routines is defined as problems in the timing and fulfilment of daily work and tasks Lastly, *compulsive procrastination* is defined as a tendency to postpone decisions about essential issues in life.(Ying & Lv, 2012). Procrastination is particularly common in the academic field (Senécal, et al., 1995). It has become even more prevalent as technology advances (Hooda & Devi, 2017). Deliberate academic delays or procrastination, such as handing in an assignment or preparing for exams at the last minute, points to academic procrastination (Schraw, et al.., 2007; Ying & Lv, 2012). However, considering the effect of self-regulation on academic procrastination, it seems correct to explain this as a motivation problem rather than a lack of time management skills and laziness (Senécal, et al., 1995). Lack of self-regulation skills more likely leads to high levels of academic procrastination (Grunschel, et al., 2013). When it comes to self-determining motivation, people have low procrastination and high grades despite their high standards (Burnham, et al., 2014).

On the other hand, Solomon and Rothblum (1984) appointed that fear of failure is a significant predictor of academic procrastination, explaining 50% of academic procrastination. They stated that fear of failure includes anxiety for being evaluated, high-performance standards, and low self-confidence. Besides, fear of failure appears to be associated with a low expectation of success (Saddler, & Buley, 1999). Afzal and Jam (2015) found that task difficulty, fear of failure, not being assertive, risk-taking was positively related to academic procrastination, while Zarrin et al.(2020) found that goal orientation, self-evaluation, responsibility etc. were associated negatively with academic procrastination. Therefore, it should be considered a more complex concept with emotional, cognitive, and behavioural dimensions (Day, et al., 2000). When students are given an assignment, they fall into a loop because of procrastination. Even though they intend to start doing the assignment early, they convince themselves to do it later. Together with this, they sink into negative emotions and thoughts because they procrastinate. The process ends with promising themselves not to procrastinate again (Burka & Yuen). Thus, cognitive factors like reframing and protective self-talk should be addressed. Nevertheless, apart from these cognitive factors, some other determinants of academic procrastination are the quality of the assignment, teachers, whether the deadline is announced, and whether the materials are well-organized (Schraw, et al., 2007).

When explanations of procrastination are examined, it is seen that the common point is to put off unnecessarily, to be reckless and lazy. However, in terms of its origin, the word means delay until tomorrow (Haghbin, 2015). Therefore, it does not contain a direct negative connotation. For example, Ferrari (1992) emphasizes procrastination in terms of thrill-seeking and being avoidant. Therefore it appears that boredom is the reason for one while it is low self-esteem for the other. However, while thrill-seeking may explain academic procrastination for some students as a perspective recently, in fact, people who state that they work better under pressure can also consciously procrastinate (Simpson & Pychyl, 2009). So, when academic procrastination is done intentionally, the results may not be as harmful as expected. For example, in a study comparing Ukraine and Slovakia, Slovak students' academic procrastination scores were higher, but their consistency to complete the task was higher than Ukrainian students (Košíková, et al., 2019). Besides, some students have good grades despite having academic procrastination (Day, et al., 2000). Westgate et al. (2016) consider productive procrastination in the academic field to postpone less critical and more accessible homework. Chu and Choi (2005) mentioned active procrastination versus traditional procrastination. They stated that active procrastinators like to feel the pressure of time, do the procrastination intentionally, reach the deadline, and are satisfied with the result.

Studies are showing that there is a relationship between academic procrastination and low academic achievement (Beswick, et al.., 1988; Carden, et al., 2004; Hayat, et al.., 2020; Kim & Seo, 2016; Moores ,2013; Rothblum, et al.., 2020; Solomon, & Murakami, 1986). On the other hand, there are various research results. For example, there is a low-level positive relationship between active procrastination and academic achievement (Choi & Moran, 2009). Grade point averages of those who showed productive procrastination in the academic field were found to be higher (Westgate et al., 2016). While a lower level of academic procrastination is associated with higher strategic learning, it may not determine the grade point average (Sæle, Dahl, Sørlie, & Friborg, 2017). As can be seen, studies on the relationship between academic procrastination and achievement point to different results. Grunschel et al. (2020), on the other hand, revealed four types of procrastination, inconspicuous, successful pressure-seeking, worried/anxious, and discontent with studies, in their latent profile analysis on academic procrastination and found that the academic

performance of these different types also differed (Grunschel et al., 2020). Therefore, when it comes to academic procrastination, it is inaccurate to mention about one behavioural pattern.

It is seen that academic procrastination and general procrastination have been investigated for many years with variable-focused approaches. A person-oriented latent profile analysis will help understand academic procrastination through group-based evaluations.. As part of this study, international students who study in Turkey and Turkish students born and raised in Turkey are recruited. Apart from their cultural differences, international students face challenges such as education in a foreign language and difficulties in cultural adaptation (Onat Karabıyıt et al., 2019). This study aims to reveal Turkish and international students' general and academic procrastination profiles using a person-oriented approach to the latent profile analysis method. In line with this purpose, latent profile analysis revealed how students from different cultures are grouped based on academic procrastination and procrastination and how the relationships between these variables are holistic.

2. Methodology

2.1.Research Model

This study was designed as a survey model to determine the latent profile of students. The purpose of the survey model is to reveal the current situation using various scales and statistical methods. The latent profiles are measured by quantitative data collection methods (Creswell 2009).

2.2. Research Sample

A total of 691 undergraduate students, 35.3% (244) males and 64.7% (447) females, participated in the study. All of the students receive their courses in Turkish within institutions in Turkey. 52.4% (361) of the study participants are Turkish, and 47.6% (330) are international students. International students are from Balkan states Balkan states such as Kosovo, Greece, Bulgaria, North Macedonia, Romania, Albania, Bosnia and Herzegovina, and Montenegro. The demographic characteristics of the participants according to nationality are shown in Table 1 in detail.

Table 1. *Descriptive Statistic by Nationality*

Variable	Nationality	
	Turkish	International
Level		
Freshman year	63 (%17,5)	65 (%19,7)
Sophomore year	153 (%42,4)	150 (%45,5)
Junior year	93 (%25,8)	75 (%22,7)
Senior year	52 (%14,4)	40 (%12,1)
Gender		
Male	128 (%35,5)	116 (%35,2)
Female	233 (%64,5)	214 (%64,8)
Total	361 (%52,4)	330 (%47,6)

2.3. Data Collection Tools and Procedure

2.3.1. Demographics Form: In this form prepared by the researchers, there are items such as gender, nationality, class to describe the students' characteristics.

2.3.2. Academic Procrastination Scale (APS): The scale developed by Çakıcı (2003) consists of 19 items, 12 of which are positive and 7 of which are negative. Confirmatory factor analysis was conducted to determine the APS construct validity. The two sub-dimensions of the scale are procrastination and regular study habits. CFA provides detailed statistics on how much the obtained (observed) data matches with the (proposed) model that describes the relationships between latent variables. Unlike traditional tests, analysis is evaluated over multiple fit indices that evaluate model-data fit instead of a single significance value. Accordingly, CFA is used to evaluate the construct validity (Jöreskog, 1974). APS consists of statements about postponing the tasks that students are responsible for in the academic field. APS was scored in a 5-point Likert type, and the internal consistency coefficient was calculated as .92. It consists of two sub-dimensions: procrastination and postponement of studying. CFA analyses were made and reported to test the validity of the APS scale used in

the research for the international group. Confirmatory factor analysis results of the APS scale are shown in Table 2. When the fit indexes were examined, it was seen that the academic procrastination scale fit well with the predicted two-factor model as a result of the confirmatory factor analysis. As a result of the model's analysis, the CFA path diagram for the scale is shown in Figure 1.

Table 2. *APS CFA Results*

Variable	DFA				
	x^2	df	CFI	GFI	RMSEA
APS	776,79	150	0.93	0.90	0.076
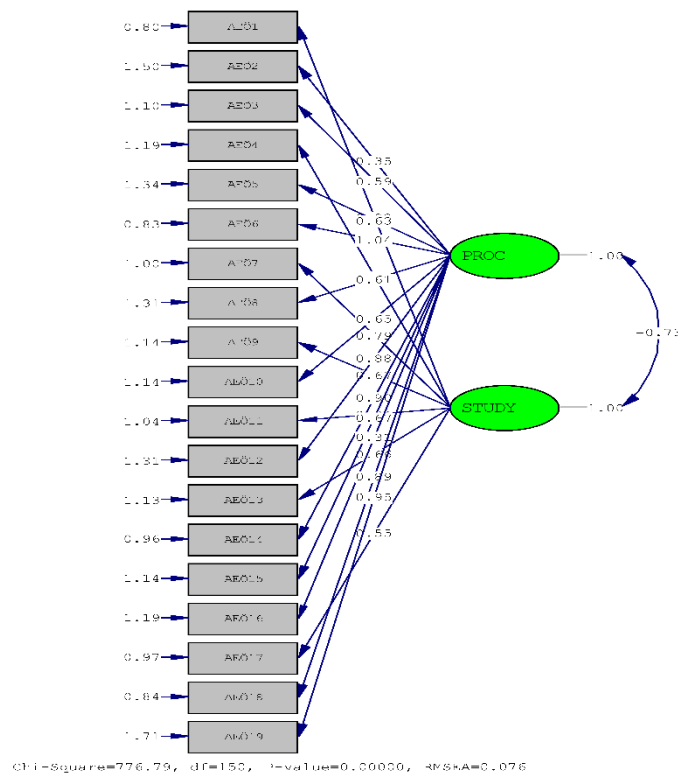
Figure 1. *Two Factor Model Path Diagram of APS*

2.4. Data Analysis

Latent profile analysis was performed for procrastination behaviour in the study. Latent profile analysis maximizes intergroup variance while minimizing intragroup variance (Collins & Lanza, 2010). In this way, profiles of people with similar response patterns can be created, and individuals can be grouped. With the help of the variables used, the focused group's profile can be created, and the subgroups' diagnostic characteristics can be determined (Berlin, et al., 2014). In latent profile analysis, the number and nature of the profiles are not known in advance. These profiles are extracted from the data (Olivera-Aguilar, et al., 2016). Model selection in latent profile analysis is the stage of deciding on latent profiles. It was suggested to compare the fit indices when determining latent profiles (Nylund, et al., 2007). In addition to the fit indices, the model's interpretability and the selection of models with fewer parameters can be empirically evaluated, and model selection can be made. Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), Sample-Size adjusted BIC (sBIC), Bootstrap Likelihood Ratio Test (BLRT), and entropy indices were used for model fit values. It is stated that comparing fit indices in selecting model fit and the lowest value gives the best fit (Muthén & Muthén, 2010). In this respect, both fit indices and empirical evaluations were taken into consideration while choosing the model. Studies indicate that the values with the lowest BIC index and

entropy value fit the model better (Akogul & Erisoglu, 2017; Muthén & Muthén, 2010) were taken into consideration. R program was used for data analysis.

2.5. Ethical

The study was approved by the Social and Humanities Research Science Ethics Committee of the Trakya University (ref #.: 2021/02/41).

3. Findings

Determining Number of Profiles: **In** Table 3, AIC, BIC, sBIC, BLRT, BLRT_p, and Entropy values show different LPA patterns. An analysis of Table 3 suggests three profiles for Turkish students and two profiles for Balkan students according to incidence emerge.

Table 3. *Model Fit of Latent Profiles*

Model	AIC	BIC	sBIC	BLRT	BLRT_p	Entropy
Turkish						
1-Class	25113.4	25203.1	25139.6	-	-	1.000
2-Class	24569.4	24847.3	24650.4	89.9	0.010	0.846
3-Class	24617.3	24801.1*	24670.9	538.1	0.010	0.775
4-Class	24497.1	24869.1	24605.5	114.3	0.010	0.864
International						
1-Class	25535.8	25625.4	25561.9	-	-	1.000
2-Class	25019.2	25202.9*	25072.7	558.6	0.010	0.722
3-Class	24953.2	25231.1	25034.2	108.1	0.010	0.759
4-Class	25813.6	26185.6	25922.1	19.2	0.723	0.673

Note. AIC=Akaike Information Criterion; BIC = Bayesian Information Criterion; SABIC = sample size-adjusted BIC; BLRT = Bootstrap likelihood ratio test. The LPAs did not converge when class number >4, so other estimates are not included here.

In Table 4, the distribution ratios of the latent profiles decided according to the model fit indices to variables (class size) and the probability of assigning them to classes are given. It is seen that the rates of assignment to classes are between 0.85 and 0.92 for all values. This finding shows that the relevant classes' individuals have a high level of belonging to the classes.

Table 4. *Class Sizes and Class Assignment Probabilities for The Profile Decision*

Model	Class size (%)	Class assignment probability
Turkish		
Advanced	22.2	.898
Moderate	11.9	.855
Low	65.9	.881
International		
Advanced	38.5	.916
Resilient	61.5	.927

As seen in Figure 2, three profiles emerge for Turkish students. High-profile students postpone regular study while their general procrastination is low. The rate of getting into this profile is 22.2%. On the other hand, procrastination is low for low profile students, but overall, procrastination is high. The rate of getting into this profile is 11.9%. In the third profile, procrastination of studying and general procrastination seem to be parallel. The rate of getting into this profile is 65.9%.
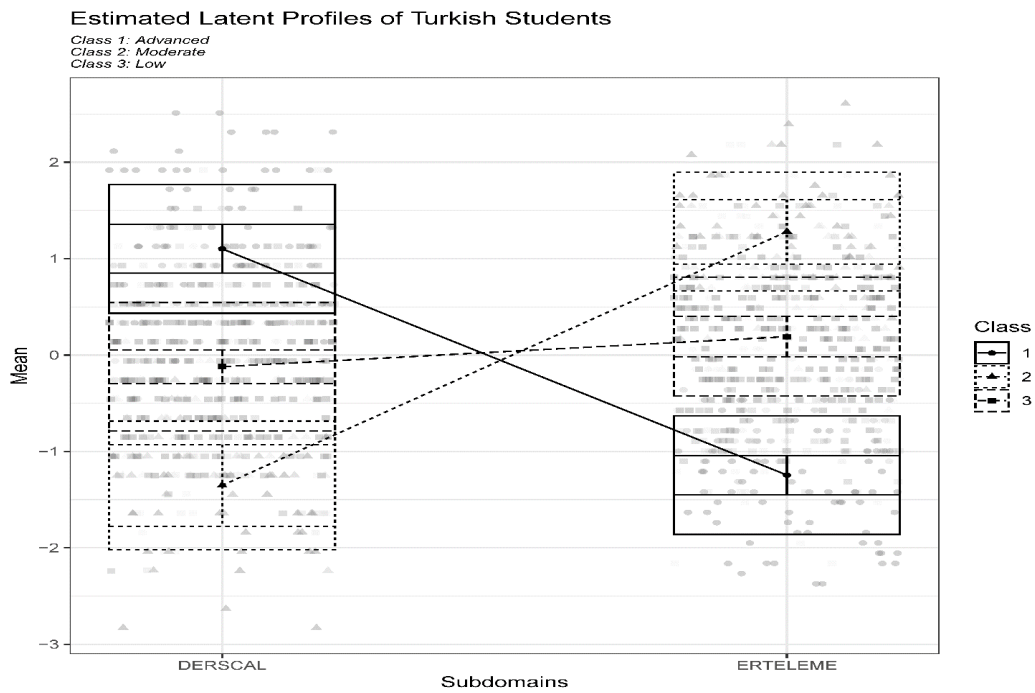
Figure 2. *Estimated Latent Profiles of Turkish Students*

As observed in Figure 3, two profiles emerge for international students. High-profile students' procrastination of studying is high while their general procrastination is low. The probability of getting into this profile is 38.5%. Procrastination of studying is low for low profile students, while overall procrastination is high. The probability of getting into this profile is 61.5%.
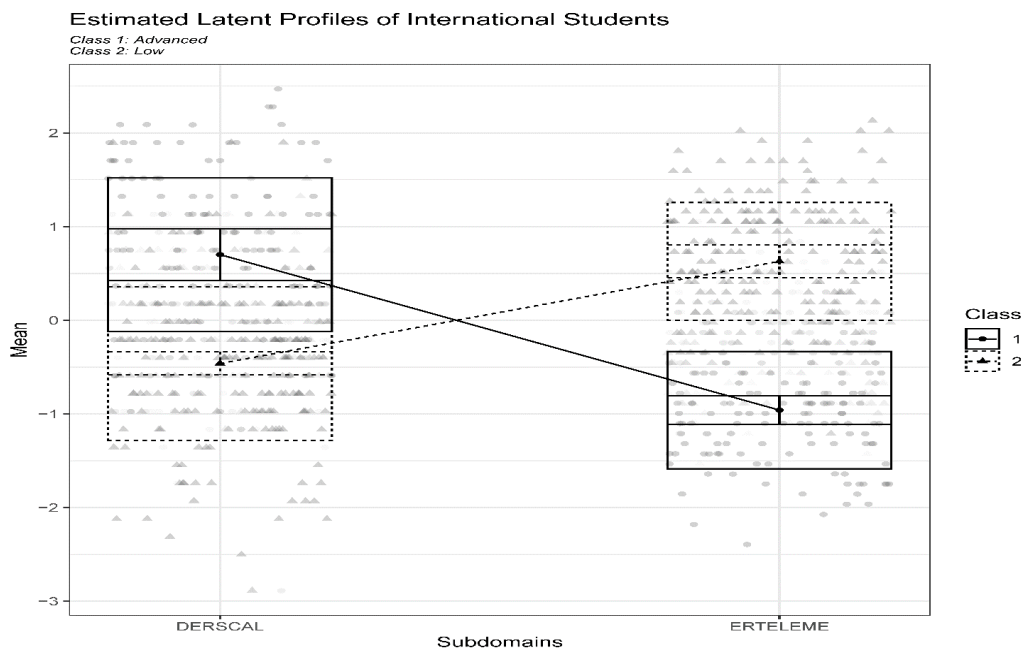
Figure 3. *Estimated Latent Profiles of International Students*

Defining Profiles for Turkish Students: As a result of the analysis, three profiles emerged for Turkish students.

Profile 1-Tending to enjoyable Works: Profile 1 characterizes those who have high procrastination of studying and low procrastination of works. When the scale items are examined, other works turn to more enjoyable activities instead of studying. These people prioritize extracurricular activities and socialization in university life more than lessons. When Turkish students' profiles are examined, it is understood from the graph that the inverse ratio between procrastination of studying and general procrastination is relatively high.

Profile 2-Neither Lessons nor Other Works: Profile 2 shows the students' profile who have no connection between their procrastination of studying and other works. These students may be unrelated to university life. It is thought that students who do not feel belonging to the school or department within the university can be included in this profile.

Profile 3-Ambition for Academic Success: Those included in Profile 3 are defined as low procrastination of studying and high procrastination of other works. Those included in Profile 3 are defined as procrastination of studying is low, and procrastination of other work is high. Profile 3 holders seem to have prioritized academic achievement. For them, it may be essential to achieve their career goals by increasing their academic achievement. They postpone the works they can enjoy. These students seem to prefer to study instead of benefiting from university life's social and other opportunities. When Turkish students' profiles are examined, it is understood from the graph that the inverse ratio between procrastination of studying and procrastination of other works is relatively high.

Defining Profiles for International Students As a result of the analysis, two profiles emerged for international students.

Profile 1-Academic Procrastination Tending to Enjoyable Works: International students whose procrastination is high while procrastination of other works is low and is included in Profile 1. Instead of preparing projects, doing homework, studying for exams, they prioritize extracurricular activities and socialization more than lessons. When international students' profiles are examined, it is observed from the graph that the inverse ratio between academic procrastination and other procrastination is relatively high.

Profile 2-Prioritizing Academic Tasks: International students whose procrastination is low while procrastination of other works is high and is included in Profile 2. Those in this profile seem to care about academic success. They postpone the things that they can enjoy. These students would rather study than benefit from university life's social and other opportunities. When international students' profiles are examined, it is understood from the graph that the inverse ratio between procrastination of studying and procrastination of other work is not as high as Turkish students.

4. Conclusion and Discussion

This study aims to reveal international and Turkish students' profiles regarding their tendency to procrastinate on their assignments. In the study, three profiles for Turkish participants and two profiles for foreign participants were created. When the graph is analyzed, there are three Turkish students' profiles; those whose academic procrastination is high and overall procrastination is low, those whose overall procrastination is high and academic procrastination are low, and those whose overall procrastination and procrastination of studying are not related. When it comes to international students, there are two profiles ; those with high procrastination of studying and low overall procrastination, and those with high overall procrastination is high and low procrastination of studying.

Research findings showed that those who procrastinate studying would not tend to postpone their other work. For example, Milgram, et al., (1998) found a high positive correlation between students' life routines and academic procrastination. Those who tend to procrastinate academically also postpone other daily tasks (Ferrari & Scher, 2000). On the other hand, Klingsieck (2013) concluded that procrastination behaviour is domain-specific.

For both international and Turkish students, this study's findings point out a standard profile with high procrastination of studying while having low procrastination of enjoyable work. This situation may occur since they are in the same age period, and peer relationships come to the fore during this period. However, there are also different profiles. It is thought that this may be due to culture. The literature shows that time orientation is related to academic procrastination and general procrastination behaviour. Jackson, et al. (2003) found that procrastination is positively associated with negative appraisal of the past and fatalism and negatively associated with a future orientation. They found that especially fatalism was the most predictive. Besides, different procrastination profiles emerged across countries in the study.

On the other hand, Specter and Ferrari (2000) saw that decision procrastination was positively associated with past orientation and negatively associated with a future orientation. Ashkanasy, et al. (2004) found that in

terms of the future orientation of western countries, Germanic-speaking countries in Western Europe and Northern Europe (e.g., Netherlands, Austria) are more future-oriented than those living in the Mediterranean region or speaking Romani languages (e.g., Greece, Italy) (Ashkanasy, et al., 2004). In a study that Turkey is included, it is concluded that the Turkish participants have a combination of future and negative past orientations. Turkish sample's moderate fatalism scores are lower than those in Serbia while their future orientation scores are higher than those in Serbia, their present orientation is high, and their negative past orientations are high (Sircova, et al., 2015).

It is thought that they may exhibit avoidance behaviour due to the problems they may experience with the language coming from the Balkans for education. One major challenge for Balkan students is related to education in a foreign language (Onat Kocabıyık et al., 2019; Özçetin, 2013). Not being proficient in the language might cause low self-efficacy (Ferrari, et al., 1992; Klassen & Kuzucu, 2009; Ying & Lv, 2012), low self-esteem (Klassen & Kuzucu, 2009; Naveed & Ishtiaq, 2015), and low Turkish language score (Klassen & Kuzucu, 2009). Also, international students who receive education at Trakya University experience problems such as being far from the family, low cultural accommodation, problems about housing, being discriminated against, loneliness, and low socialization (Onat Kocabıyık, 2019). In addition to all these, social and family problems, overconfidence, negative behaviours of the teacher, lack of coordination with classmates, and communication gaps can also increase procrastination (Hussaina & Sultan, 2010).

4.1 Limitations and Recommendations

This study was carried out on academic and general procrastination of international students, especially from the Balkan countries and who studied in Turkey and Turkish students. The generalisability of these research outcomes has some limitations. The most important limitation is that country-based profile analyses can be made for students by accompanying a large sample size for each country. Unfortunately, the study did not compare the students for different education levels like high school and graduate school. Empirical support for various independent categories, e.g., gender, socio-economic status, is not provided due to the lack of information.

Considerably more work will need to be done to determine the latent profiles of students with regards to socio-economic status, course quality, instructor characteristics, social life, adaptation problems other than the country, and gender. The study's findings provide the following insights for future research: Further investigation and experimentation into academic procrastination is strongly recommended. International and local student centres especially psychological counselling, need to validate the latent profile of students on academic procrastination. Various group counselling activities are recommended for students struggling with academic procrastination to overcome the considerable concerns on procrastination.

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Examining 4th Grade Gifted and Non-Gifted Students Understanding Levels of Place Value

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ARTICLE INFO	ABSTRACT
	The aim of this research is to reveal the understanding of dimensions and sub-dimensions of the place value in natural numbers of gifted and non-gifted students attending fourth grade. A mixed approach was adopted in the research. The research is quantitative in terms of revealing the levels of place value, counting, representing, naming, renaming, comparing and calculating the dimensions of the students and comparing the general mean score of both groups with the mean score for each dimension, and it is qualitative in terms of revealing the mistakes made in these dimensions. The study group of the research consists of 76 students diagnosed as gifted who attend four different SACs and 90 non-gifted fourth grade students attending in a regular school in town in the Central Anatolia Region. According to the findings obtained in the research, it was revealed that students with a diagnosis of giftedness could not reach the desired learning level in the count by 10 forward sub-dimension of the counting dimension of the place value. It was also revealed that they could not reach the desired learning level in the non-standard representation sub-dimension of the representation dimension. On the other hand the non-gifted students could not reach the desired learning level also in the division sub-dimension of the calculation dimension. It was concluded that students that are diagnosed as gifted had high success in terms of understanding the place value of natural numbers. For both groups of students, it can be said that they have difficulties in operations with non-standard representations, and they have difficulty in thinking differently because they are used to doing the questions by memorization and rules. Experimental studies can be carried out on the dimensions of the place value. Keywords: Primary education, fourth grade, dimensions of place value, gifted students, mathematics education

1. Introduction

Several definitions of math concepts are reported. But the most basic definition among them is that it is a science that examines the structures, properties and relations of forms, and numbers and quantities through deductive reasoning and devotes to branches such as arithmetic, geometry, and algebra (Püsküllüoğlu, 2003). Mathematics as science consists of a system formed in the mind compared with the visible systems. The reason for this is the absence of smell, hardness, color, and the inability to be perceived by the sensory organs; and therefore, mathematics is created entirely by reason (Baykul, 2002). Numbers are one of the fundamental concepts of this system, which is formed in the mind and is entirely abstract. The numbers represented as symbols employed in the written representation of the numbers, which are the basis of all operations, play an essential role in the function and development of mathematics because they are utilized to express nearly any value ranging from very small to very large numbers. The values expressed by the numbers differ according to the digit they are in.

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It is important to learn the concept of place value in primary school years, to display the numbers in a regular way, and to reach the correct result of mathematical operations. Place value refers to the value that the numbers take according to their position in the number. In other words, the place values of the numbers represent the value of that number. Nowadays, the decimal number system is widely used. Ten basic symbols in the range of 0–9 are called numbers in this system. This is called the 10-point system because the multiplicities can be expressed in groups of ten and the expansion of each number can be written as the powers of 10 (Billstein, Libeskind, & Lott, 2013; Demirtaş, 1986; Dinç-Artut, & Tarım, 2006; Hacısalihlioglu, Hacıyev, & Kalantarov, 2000; Rappaport, 1966; Skemp, 1993; Sovchik, 1989). The concept of place emerges as a result of the grouping process in question, and each number gains value based on the place it is in. Whereas the number to the right of a natural number represents the digits digit, the number to the left of this digit represents the tens digit formed by grouping the troops into decimals. Hundreds, thousands, and tens of thousands follow the places, respectively.

It can be said that it has a stronger sequential structure compared to other subjects in terms of the subjects included in the mathematics course. The necessity of establishing solid foundations on mathematical subjects and concepts at a young age and structuring appropriate educational experiences on mathematics education is emphasized in the associated literature (Şengül & Ekinöz, 2007; Tutak, et al., 2012). It is believed that this is the only method for students to learn the mathematical skills they will need throughout their academic life. It is not possible to say that the concept is taught completely without introducing any precondition of any mathematical concept. This fact is also taken into account in the teaching of number and place value concepts. More specifically, two-digit numbers can be taught before single-digit numbers; it is unthinkable that three-digit numbers can be taught before two-digit numbers. The objectives related to the teaching of the number and place value concepts have been addressed to continue until the end of secondary school in the primary and secondary school mathematics curriculum. These concepts are a prerequisite for a spiral course of mathematics (Paydar & Sarı, 2019; Rohrer, 2009). The concept of place is important for all mathematical operations.

The findings of the research on the concept of place value reveal that concept teaching takes a long time and that numerous problems were experienced in the education-training process of concept teaching. For example, Kamii and Joseph (1988) asked elementary school students the place value of the number of a two-digit number in their study. The researchers concluded that the participant students only considered the number value by ignoring the place value of the number in their stage of evaluation after observing that 33% of the students studying in the third grade at the end of the semester and 50% of the students studying in the fourth grade answered the question correctly.

Vareles and Becker (1997), who established a methodology for teaching the concept of place value, sought an answer to the question of whether students aged 7 and 10 can discriminate between place value and number value in their research. It was concluded that 96.5% had difficulty in distinguishing the place value concept and the number value concept even though the students who participated in the study had preliminary information about the place value concept as a result of the pretest applied. It was also concluded in this study that the information that the sum of the place values of the numbers in a multi-digit number is equal to the number is not well understood. The development of the concept of place value in students means that it is not only possible with the correct reading or correct representation of the numbers but also the correct analysis of the number.

Thompson (2000) stated that most students envision the concept of place value in their minds in their primary school years but continue to be confused about this for a long time. Jones and Thornton (1993) also stated in their study on place value that elementary school students studying in the United States, in general, did not learn the concept of place value effectively. These situations are one of the challenges faced by all primary school students in several countries. Dinç-Artut and Tarm (2006) conducted research on the concept of place value with 728 elementary students from the second, third, fourth, and fifth grades. The study concluded that the students have answered the questions about the concept of place value somehow correctly in general and at the level of all classes, but there were many issues regardless of the students' grade levels. It was found that the difficulties encountered in the subject did not make a significant difference in terms of the gender variable. Other studies on place value in the literature stress that the great majority of students' arithmetic errors are attributable to a lack of comprehension of the place value concept (Arslan, Yıldız, & Yavuz, 2011; Arslan &

Ubuz, 2014; Bowers, Cobb, & McClain, 1999; Carpenter, et al., 1982; Dinç-Artut & Tarım, 2006; Kaplan, 2008). These studies have revealed that primary and secondary school students have problems in understanding the concept of place value, performing other operations related to it, or developing algorithms related to these processes.

Rogers (2014) emphasized that there are deficiencies in the process of learning and teaching the place value. He stated that the structure and evaluations in the curriculum were insufficient in teaching the place value. He stated that students have a shallow understanding because place value is taught straightforwardly in schools. He studied the values in seven dimensions as counting, representing, naming, renaming, comparing, estimating, and calculating dimensions with his experimental study in third–sixth grades in this context. He suggested that six dimensions would be adequate to describe the place value by excluding the estimate dimension as a consequence of the experimental investigation.

The dimensions he (Rogers 2014) handled in the concept of place can be summarized as follows:

Counting: Counting with 10 and its multiples forward and backward to understand the place value in rhythmic counting.

Naming: Reading a number expressed in symbols and expressing a number written in writing with symbols (numbers).

Renaming: This includes the grouping and naming of multiplicities in different formats as usual or unusual (e.g., "2340" number is called "2 thousand, 3 hundred, 4 decade" on the basis of the usual digits, and "2 thousand, 2 hundred, 14 decade" can it also be referred to.)

Representation: The expression of numbers in proportional/standard and non-proportional/non-standard representations using a set of materials or manipulatives. For example, proportional/standard representations: base blocks of decimal, objects/shapes may be used in non-proportional/non-standard representations.

Comparison: This refers to comparing the numbers according to their size and smallness.

Calculation: Understanding the natural value digit system using four processing skills (e.g., if we multiply 28 by 10, it turns to 280, 300 + 15 = 315. If we divide 250 by 10, it is 25).

The gifted students, who are subjected to a different education program than the education programs prepared for students with normal development in our country, receive education in Science and Art Centers (SAC). Students are nominated for the SAC by their classroom teachers. Candidate students who pass the group screening exam are invited to the individual examination. Then students who are identified as gifted are registered in the SAC (Bildiren, 2018). In these educational institutions, separate education, enrichment, deepening, and acceleration models are used considering the course contents (MoNE, 2015; Yıldız, 2010). When the educational strategies of gifted students are examined, grouping, acceleration, enrichment, and mentoring training strategies are used (Sak, 2017). In SAC, activities that provide high-level thinking skills are included, and these activities are based on project production and development. The programs used in the education of gifted students aim to gain in-depth behavior in a discipline by using disciplinary and interdisciplinary approaches (Bildiren, 2018). Gifted people are defined as individuals with superior performance compared to their peers in one or more areas, who have a strong creativity aspect, can complete and overcome the project they started, and have extraordinary thinking and problem-solving abilities (Davis & Rimm, 2004; Gardner, 2011; Guilford, 1967; Özbay, 2013). Experts state that these students perform at a high level in intelligence, creativity, art, leadership, or special academic fields compared to their peers (MoNE, 2015). Some features in early childhood or school age can help us distinguish gifted children. These features are speaking in correct sentences in the ages of 1 and 2; starting reading and writing at 3 and 4 or earlier; simple arithmetic problem solving at the ages of 3 and 4 or younger; and adult-level performance in areas including painting, music, mathematics, and creative writing before the age of 10 (Sak, 2017). Students who are not identified as gifted differ from those who are non-gifted in terms of their characteristics, educational strategies, understanding, and perspectives. This difference requires examining the answers that gifted students give to the mathematical problems that are done in the usual and unusual mathematics lesson, as in other courses. The differences in the point of view, solution method, question perception, and the mistakes they make should be examined according to the students who are not recognized as gifted. Especially in the

primary school age, which is a concrete operational period, knowing how gifted students use these skills and their difficulties may be important in terms of identifying these students and shaping their education programs more efficiently.

There is no study on the concept of place value for students who are determined to be gifted by experts in the literature review. Knowing the mistakes students make about the place value, which is the basis of the mathematics subjects in the curriculum, can make it easier for them to understand and grasp the next topics; it can contribute to taking necessary precautions in the teaching process. This research aims to reveal the primary school fourth-grade students' understanding of dimensions (counting, naming, renaming, representing, comparing, and calculating) and sub-dimensions of the place value in natural numbers who attend Science and Arts Center (SAC) and their peers who attend public school and to reveal whether students attending public schools differ from students who attend SAC.

Therefore, in this research, answers to the following questions were studied:

- Is there a difference between the general average scores of gifted and non-gifted students?
- Is there any difference between the average scores of gifted and non-gifted students for each of the counting, representing, naming, renaming, comparing, and calculating dimensions?
- What are the levels of gifted students of reaching the counting, representing, naming, renaming, comparing, calculating, and sub-dimensions and what are their mistakes?

2. Methodology

2.1. Research Model

The mixed method was used as a research method. The concurrent mixed method was chosen for the research of the mixed research methods. The research was performed as a quantitative study in terms of collecting data from the students who are gifted and non-gifted to reveal the level of reaching each sub-dimension of the value of the digits in natural numbers and the comparison of the general averages and the averages for each dimension of the students diagnosed who are gifted and non-gifted. The qualitative study was carried out to reveal the mistakes for each dimension for the students who are gifted and non-gifted.

In mixed-model studies, qualitative and quantitative data are used together to make multi-dimensional and more detailed examinations. The mixed method, which uses both qualitative and quantitative dimensions, can be used to examine the events and facts in more depth, as a whole, and in a richer framework (Yıldırım & Şimşek, 2016). The concurrent mixed pattern consists of a wide pattern of one or more types of data (either quantitative or qualitative or combined). Research data are collected and analyzed in traditional quantitative and qualitative patterns (Creswell, 2013; Teddlie & Tashakkori, 2015). In this study, when comparing the average achievement of students, a concurrent mixed pattern was preferred because the situation of gifted students was supported by qualitative data.

2.2. Research Sample

A total of 166 students participated in the study, including 76 fourth-grade students diagnosed as gifted and 90 fourth-grade students as non-gifted. Different sampling types were used when choosing the sample of the study. The study consisted of 90 students attending the fourth grade of a total of four public schools in the district center of a province in the Central Anatolia Region. Non-gifted students were selected from schools that researchers could easily access.

Seventy-six gifted students from four different SACs in different regions of Turkey were selected using a convenient sampling method. Büyüköztürk et al. (2011) stated that the main purpose of appropriate sampling method is to prevent loss of time, money, and labor. In the appropriate sampling method, the researcher continues to collect data starting from the most accessible responders to forming the sample until the research reaches the sampling size it needs. It was especially preferred that gifted students be from different regions of the country. Students who pass the science exam in SACs receive different trainings and those who enter from separate art (music and painting) fields. This study was conducted only with students who passed the science

exam. Therefore, this study was carried out with a group that can be considered mathematically gifted. This study is limited to fourth-grade students who are gifted and non-gifted and the concept of place value.

2.3. Data Collection Tools and Procedures

The "natural numbers in the value test" developed by Paydar (2018) was used as a data collection tool in this study, which aims to reveal understanding in the dimensions and sub-dimensions of the place value in natural numbers for the status of the gifted students and non-gifted levels.

The reliability of the test consisting of 20 questions developed by Paydar (2018) was calculated as 0.88. In addition, the Cronbach alpha value for this study was calculated as 0.86. The suitability of the data collection tool for gifted fourth-grade students has been confirmed by a mathematics teacher who works at the SAC and also continues his doctorate education. In the measuring tool, there are questions including six dimensions of the place value and sub-dimensions of these dimensions. The scope of the current scale is expressed in Table 1.

Table 1. *Relevant Question Items Containing Dimensions and Sub-dimensions in the Measuring Tool*

Dimensions of the place value	Sub-dimensions of the place value	Question items
Counting	Counting Forward	1, 3
	Countdown	2, 4
Naming	Read	5
	Write	6
Renaming	Ordinary Expression	12, 13
	Extraordinary Expression	10, 11
Representing	Standard / Proportional Representation	7, 9
	From representation to number	8
Comparison	Big	14
	Between	15
Calculation	Small	16
	Addition	17
	Extraction	19
	Multiplication	20
	Division	18

Table 1 shows that the scale developed by Paydar (2018) has 20 items measuring all different dimensions and sub-dimensions. Items 1 and 3 measure the dimensions of counting numbers and tens forward, and items 2 and 4 measure counting down numbers and tens. The fifth item measures the reading sub-dimension of the naming dimension, and the sixth item measures the writing sub-dimension. Items 12 and 13 measure the sub-dimension of the renaming dimension, and items 10 and 11 measure the sub-dimension of the unconventional expression. Items 7 (from representation to number) and 9 (from number to representation) measure the standard/proportional representation sub-dimension and item 8 of the standard/non-proportional representations. The 14th item of the comparison dimension ranging from large to small is measured by item 14, the sub-dimension of finding the number between two numbers is the 15th item, and the lower order sorting dimension is the 16th item. The sum of the calculation dimension sub-dimension is the 17th item, subtraction sub-dimension is the 19th item, multiplication sub-dimension is the 20th item, and division process sub-dimension is the 18th item.

2.4. Data Analysis

Total scores were obtained by using the code 1 for each correct answer to the questions and 0 for each wrong and blank answer. The levels of gifted and non-gifted students for each dimension and sub-dimension are expressed as frequency and percentage. The size and level of reaching the sub-dimensions 75% were determined as a limit. Students who have reached 75% or above have been accepted as successful in the relevant dimension and sub-dimension. Özçelik (2010) stated that there is strong evidence showing that 75%–85% of the previous course's behavior should be learned in progressive courses. According to Baykul (2016), if a behavior was not acquired by 75% of the class, related behavior could not be learned in the class.

Independent groups *t* test was performed to compare the overall average achievement scores and the achievement scores of students attending SAC and public school for each dimension. The independent groups *t* test is a parametric test that tries to reveal the significance of the difference in the means of two independent samples at a selected probability level (Gay, Mills, & Airasian, 2012).

The content analysis method was used to analyze the errors of gifted students in each dimension and sub-dimension. It may not always be possible to directly observe, measure, and gain first-hand experience of human behavior. We can indirectly learn about human behavior through various communication methods with people using the content analysis method (Fraenkel et al., 2012). For the questions that include the sub-dimension of each dimension, the error types were determined separately by a classroom teacher and the field specialist. Comparisons were made between these two coders using the coherence formula of Miles and Huberman (reliability = consensus/consensus + disagreement × 100) (Miles & Huberman, 1994). The agreement ratio between the two encoders was obtained as 0.93. Then the types of errors with disagreement were evaluated together, and the final error types were determined. The types of errors previously identified in the literature are also added to the data analysis process.

2.5. Ethical

Ethics committee permission was obtained with the decision dated 22.04.2020 and numbered 2020-11/15 E. 16862 from the Social and Humanities Ethics Committee of Kahramanmaraş Sütçü Imam University before the data collection process.

3. Findings

In this section, the situation of the students about the place value is tried to be revealed with the place value test in line with the answers given by the fourth-grade students who are gifted and non-gifted. Findings obtained in this context are presented in line with sub-problems.

Findings Regarding the General Average Scores of Gifted and Non-Gifted Students

Within the scope of the first sub-problem of the research, Table 2 shows the results regarding the general average scores of gifted and non-gifted students.

Table 2. *The T-test Results Related to the Mean Value Test Average Scores of Gifted and Non-Gifted Students in Natural Numbers*

Student Type	N	M	SS	Sd	t	p
SAC	76	.8664	.099	164	11.848	.000
Public School	90	.5596	.220			

When the *t*-test results are examined, the average success value of the gifted students in natural numbers is 0.8664, and the standard deviation of this group is 0.099. The average achievement value of non-gifted students is 0.5596, and the standard deviation of this group is 0.220. The average value of the students' grade point value of gifted students is significantly higher than the average education level of non-gifted students, $t(164) = 11.848$; $p < 0.05$; $r^2 = 0.461$. It is seen that gifted students have higher success in place value than non-gifted students. Cohen (1988) stated that a significant difference with a high effect size (eta squared = 0.46) was found between the groups as a result of the independent sample *t* test.

Average Score Differences for Each Dimension of the Place Value of Gifted and Non-Gifted Students

Within the scope of the second sub-problem of the research, the findings regarding the difference between the mean scores of the non-gifted and gifted students for the natural numbers are counted; representing, naming, renaming, comparing, and calculating are tried to be revealed.

Average Score Differences in the Counting Dimension of the Place Value of Gifted and Non-Gifted Students

Table 3 shows the results regarding the mean score differences in the counting dimension of the place value of the students in both groups.

Table 3. *Average Score Differences in The Counting Dimension of the Place Value of the Students Who Gifted and Non-Gifted in Natural Numbers*

Student Type	N	X	SS	Sd	t	p
SAC	76	.8454	.182			
Public School	90	.6778	.262	164	4.826	.000

When the *t*-test results are examined, the average success of the gifted students in the counting dimension of the place value in natural numbers is 0.8454, and the standard deviation of this group is 0.182. The average achievement in the counting dimension of the place value of the non-gifted students is 0.6778, and the standard deviation of this group is 0.262. The success rate of gifted students in the counting dimension of natural numbers is significantly higher than the average in the counting dimension of natural numbers of non-gifted students, $t(164) = 4.826$; $p < 0.05$; $r^2 = 0.12$. It is seen that the gifted students have higher achievements in the counting dimension in natural numbers than the non-gifted students. Cohen (1988) stated that a significant difference with a medium effect size (eta squared = 0.12) was found between the groups as a result of the independent sample *t* test.

The Average Score Differences in Representing the Place Value of Gifted and Non-Gifted Students

Table 4 shows the results regarding the mean score differences in the dimension of representing the place value of the students belonging to both groups.

Table 4. *Average Score Differences of the Gifted and Non-Gifted Students in the Representation Dimension of the Natural Numbers*

Student Type	N	M	SS	Sd	t	p
SAC	76	.7588	.240			
Public School	90	.3519	.371	164	8.485	.000

When the *t*-test results are examined, the average success of gifted students in representing the place value is 0.7588, and the standard deviation of this group is 0.240. The average achievement in representing the place value of non-gifted students is 0.3519, and the standard deviation of this group is 0.373. The success rate of gifted students in the representation dimension of natural numbers is significantly higher than the average in the representation dimension of natural numbers of non-gifted students, $t(164) = 8.448$; $p < 0.05$; $r^2 = 0.30$. It is seen that the success of gifted students in representing is higher than the non-gifted. Cohen (1988) stated that a significant difference with a high effect size (eta squared = 0.30) was found between the groups as a result of the independent sample *t* test.

Average Score Differences in the Renaming Dimension of Gifted and Non-Gifted Students

Table 5 shows the results regarding the mean score differences in the renaming dimension of the place value of the students belonging to both groups.

Table 5. *Average Score Differences in the Renaming Dimension of the Place Value of the Gifted and Non-Gifted Students*

Student Type	N	M	SS	Sd	t	p
SAC	76	.8914	.149			
Public School	90	.5333	.317	164	9.533	.000

When the *t*-test results are examined, the average success of gifted students in the renaming dimension of the place value is 0.8914, and the standard deviation of this group is 0.149. The average success of the non-gifted students in the renaming dimension of the place value is 0.5333, and the standard deviation of this group is 0.317. The average success rate of students that are gifted in the renaming dimension of the students that are non-gifted is significantly higher than the average success rate in the renaming dimension of students, $t(164) = 9.533$; $p < 0.05$; $r^2 = 0.36$. It is seen that the success of gifted students in renaming is higher than the non-gifted students. Cohen (1988) stated that a significant difference with a high effect size (eta squared = 0.36) was found between the groups as a result of the independent sample *t* test.

Average Score Differences in the Naming Dimension of Gifted and Non-Gifted Students

Table 6 shows the results regarding the mean score differences in the naming dimension of the natural values of the students belonging to both groups.

Table 6. *Average Score Differences in the Naming Dimension of the Natural Number of Gifted and Non-Gifted Students*

Student Type	N	M	SS	Sd	t	p
SAC	76	.9605	.135	164	3.026	.003
Public School	90	.8444	.332			

When the *t*-test results are examined, the average success of gifted students in the naming dimension of the place value is 0.9605, and the standard deviation of this group is 0.135. The average success of the non-gifted students in the naming dimension of the place value is 0.8444, and the standard deviation of this group is 0.332. The average success rate of the place value of giftedness students is significantly higher than the average success rate of the place value of the non-gifted students, $t(164) = 8.448$; $p < 0.05$; $r^2 = 0.05$. It is seen that the success of gifted students in the naming dimension is higher than gifted students. Cohen (1988) stated that a significant difference with a low effect size (eta squared = 0.05) was found between the groups as a result of the independent sample *t* test.

Average Score Differences in the Comparison Dimension of Gifted and Non-Gifted Students

Table 7 shows the results regarding the mean score differences in the comparison dimension of the place value of the students belonging to both groups.

Table 7. *Average Score Differences of Students Who Gifted and Non-Gifted in Comparison to the Natural Numbers in Terms of Their Place Value*

Student Type	N	M	SS	Sd	t	p
SAC	76	.9605	.108	164	7.380	.000
Public School	90	.7074	.303			

When the *t*-test results are examined, the average value of the gifted students is 0.9605, and the standard deviation of this group is 0.108. The average success of the students that are non-gifted in the comparison dimension of the place value is 0.7074, and the standard deviation of this group is 0.303. The average success of gifted students in the comparison dimension of the place value of non-gifted students is significantly higher than the average in the comparison value of the place value, $t(164) = 7.380$; $p < 0.05$; $r^2 = 0.24$. It is seen that the success of gifted students in comparison is higher than the students attending public school. Cohen (1988) stated that a significant difference with a medium effect size (eta squared = 0.24) was found between the groups as a result of the independent sample *t* test.

Average Score Differences in the Calculation Dimension of Gifted and Non-Gifted Students

Table 8 shows the results regarding the mean score differences in the calculation dimension of the place value of the students belonging to both groups.

Table 8. *Average Score Differences of the Students Who Gifted and Non-Gifted in the Natural Numbers in the Calculation Dimension of the Place Value*

Student Type	N	M	SS	Sd	t	p
SAC	76	.8224	.190	164	8.426	.000
Public School	90	.5222	.266			

When the *t*-test results are examined, the average success of gifted students in the calculation dimension of the place value is 0.8224, and the standard deviation of this group is 0.190. The average achievement in the calculation dimension of the place value of non-gifted students is 0.5222, and the standard deviation of this group is 0.266.

The average success rate of gifted students in the calculation dimension of the place value of non-gifted students is significantly higher than the average success rate in the calculation dimension, $t(164) = 8.426$; $p < 0.05$; $r^2 = 0.30$. It is seen that the success of gifted students in the calculation dimension is higher than the non-gifted students. Cohen (1988) stated that a significant difference with a high effect size (eta squared = 0.30) was found between the groups as a result of the independent sample t-test.

Reach Levels Regarding Dimension and Sub-Dimensions of Place Value and Errors

In this section, within the scope of the third sub-question, gifted and non-gifted students reach levels for each dimension and its sub-dimensions are determined. At the same time, the errors that gifted students made in each dimension and sub-dimension were analyzed.

Reaching Levels and Errors on Counting Dimension

Table 9 shows the achievement levels of the gifted and non-gifted students regarding the sub-dimensions of the counting dimension. The level of attaining achievements has been determined as 0.75 (Özçelik, 2010; Turgut & Baykul, 2014). In the placement test, if there is more than one item for a gain, the item with the highest level of attainment was taken.

Table 9 reveals that the fourth-grade gifted students have the desired learning level in the sub-dimensions of the counting dimension of the place value in natural numbers (94%), 1 counting back (84.2%), and 10 counting backs (96.1%).

Table 9. *The Levels of Reaching the Behaviors Related to the Sub-Dimensions of the "Counting" Dimension of Fourth Grade Gifted and Non-Gifted Students*

Sub dimensions	Gifted students correct		Gifted students wrong or no answer		Gifted students total		Non-gifted students correct		Non-gifted students wrong or no answer		Non-gifted students total	
	n	%	n	%	n	%	n	%	n	%	n	%
1) Counting forward	72	94,7	4	5,3	76	100	69	75,8	21	23,1	90	100
2) Counting down	44	84,2	12	15,8	76	100	81	89	9	9,9	90	100
3) Count by 10 forwards	48	63,2	28	36,8	76	100	28	30,8	62	68,1	90	100
4) Count by 10 down	73	96,1	3	3,9	76	100	66	72,5	24	26,4	90	100

Considering that 75% of the learning has to take place, it is seen that gifted students only do not reach the desired level of learning in the sub-dimension of the count by 10 forwards (63.2%). Non-gifted students, which is the desired learning level in counting forward sub-dimensions (75.8%) and counting down (89%). It is observed that they do not reach the desired level of learning in the sub-dimensions of 10 forward, 30.8%, and 10 counts (72.5%). Table 10 shows the errors of gifted students related to the sub-dimensions of the counting dimension.

Table 10. *The Mistakes Made by the Fourth-Grade Gifted students Regarding the Sub-Dimensions of the "Counting" Dimension to Understand the Place Value*

Sub dimensions	Questions	Error type	f	Error examples
Counting forward	How many more blocks are needed to complete 100 blocks to 1000?	1) Responding regardless of the multiplicity expressed by the given model	15	"10"
		2) Reducing the value of places to multiplicity	12	"900"
	What is the number after 9999?	3) Add unnecessary places while counting forward	2	"100000"
		4) Irrelevant answer to the question	2	"One million"
Counting down	What is the number before 1100?	1) Finding the next number instead of the previous number	3	"1101"
		2) Reducing unnecessary places from the number	2	"999"

When Table 10 is examined, 31 errors were made in the forward counting sub-dimension of the count value of natural numbers and 5 errors in the sub-dimension of the counting down. In the forward counting sub-dimension of the students, "responding regardless of the multiplicity given by the given model" 15, "reducing to the multi-place value" 12, adding unnecessary digits while counting forward 2, and "answering unrelated

to the question" 2. In the countdown subscale, it is seen that students make the mistakes of "finding the next number instead of the previous number" 3 and "reducing unnecessary places from the number" 2.

Reaching Levels and Errors Made on Naming Dimension

Table 11 shows the levels of reaching the sub-dimensions of the naming dimension of gifted and non-gifted students.

Table 11. *Level of Reaching Behaviors Related to the Sub-Dimensions of the "Naming" Dimension of Fourth-Grade Gifted and Non-gifted Students*

Sub dimensions	Gifted students correct		Gifted students wrong or no answer		Gifted students total		Non-gifted students correct		Non-gifted students wrong or no answer		Non-gifted students total	
	n	%	n	%	n	%	n	%	n	%	n	%
Reading	72	94,7	4	5,3	76	100	76	84,4	14	15,6	90	100
Writing	72	97,4	4	5,3	76	100	76	84,4	14	15,6	90	100

Table 11 shows that fourth-grade students who are gifted reach the desired learning level 75% in the reading sub-dimension (94.7%) and the writing sub-dimension (97.4%) in the natural numbers. Likewise, it is seen that fourth-grade non-gifted students have reached the desired learning level in both the reading (84.4%) and writing (84.4%) sub-dimensions. Table 12 shows the errors of gifted students regarding the dimension of not naming sub-dimensions.

Table 12. *The Errors Made by the Fourth-Grade Students that are Gifted Regarding the Sub-dimensions of the "Naming" Dimension to Grasp the Place Value*

Sub dimensions	Questions	Error type	f	Error examples
1) Reading (Reading number)	Write the reading of the number 1005.	Ignoring zero's placeholding	1	"105"
2) Writing (Symbolizing verbal expression)	Write the number "four thousand seven hundred three" in numbers.	Ignoring zero's placeholding	1	"473"

When Table 12 is examined, it can be said that students made very few mistakes in the naming dimension of natural numbers. In both reading and writing subscales, the error of ignoring zero's placeholding 1 was made.

Reaching Levels and Errors Regarding the Representation Dimension

Table 13 shows reaching levels of students that are gifted and non-gifted regarding the subdimensions of the representation dimension. When Table 13 is examined, it is seen that the gifted students have reached the desired level of learning in the standard representation number (81.6%) and the standard/proportional representation (81%, in the standard representation number), which is both forms of the standard/proportional representation sub-dimension of the value of representing the place value in the natural numbers.

Table 13. *The Levels of Reaching Behaviors Related to the Sub-dimensions of the "Representation" Dimension of Fourth-Grade Gifted and Non-gifted Students*

Sub dimensions	Gifted students correct		Gifted students wrong or no answer		Gifted students total		Non-gifted students correct		Non-gifted students wrong or no answer		Non-gifted students total	
	n	%	n	%	n	%	n	%	n	%	n	%
1.Standard/ Proportional representation	62	81,6	14	18,4	76	100	27	30,0	63	70,0	90	100
2.Standard/ Proportional representation	62	81,6	14	18,4	76	100	30	33,3	60	66,7	90	100
3.Standard/ Non-proportional representation	49	64,5	27	35,5	76	100	38	42,2	52	57,8	90	100

In the sub-dimension of expressing the given expression with non-standard/proportional representations (64.5%), gifted students could not reach the desired level of learning. Expressing the standard/proportional representation sub-dimension of the representation value of the place value in natural numbers of non-gifted

students (30%), expressing the number with a standard/proportional representation (33.3%), and expressing the given expression with non-standard/proportional representations (42.3%), it is observed that they do not reach the desired level of learning in their sub-dimensions. Table 14 shows the errors related to the sub-dimensions of the representation dimension of the gifted students.

Table 14. *The Errors Made by the Fourth-Grade Students that are Gifted Regarding the Sub-dimensions of the "Represent" Dimension to Grasp the Place Value*

Sub dimensions	Questions	Error types	f	Error examples
Standard/ proportional representation	Draw the model expressed by the number 356 using the hundreds, tens, and ones number blocks.	1)Writing the number values of the representations	5	3 5 6 pieces
		2) Drawing missing representations	5	
		3) Not using representation	1	"3 hundreds, 5 tenner and 6 ones"
Non-standard, non-proportional representation	Show the number 5357 by drawing it with the given symbols. Ones = △ Tenner = ● Hundred = ▪ Thousand = ◆	1) Drawing the place expressed by the representations in a complex order regardless of place value	14	
		2) Writing the place value of the representations	5	△ = 7; ● = 50; ▪ = 300; ◆ = 5000

Students that are gifted made 30 errors in the sub-dimension of representing the value of the place value in natural numbers with standard representations. While students expressed the numbers with standard representations, they made the mistakes of "writing number values of representations" 5, "drawing missing representations" 5, "unable to sort representations" 4, and "not using representation" 1. While expressing standard/proportional representations by numbers, "not being able to grasp the place of zero" 9, "misprinting symbols" 1, "use of zero in the wrong place" 1, "not taking into account all representations" 1, and "irrelevant answering" 3 errors were made. In the sub-dimension of expressing with standard/non-proportional representations, students made 22 mistakes. These errors are "drawing the digits expressed in complex order regardless of their digits" 14, "writing the place value of the symbols" 5, "writing the numerical value of the symbols" 2, and "drawing missing representations" 1. Some examples of errors are not included in Table 14.

Reaching Levels and Errors Made About the Renaming Dimension

Table 15 shows the levels of reaching the sub-dimensions of the renaming dimension of students that are gifted and non-gifted.

Table 15. *The Levels of Achieving Behaviors related to the Sub-dimensions of the "Rename" Dimension of Fourth-Grade Students that are Gifted and Non-gifted*

Sub dimensions	Gifted students correct		Gifted students wrong or no answer		Gifted students total		Non-gifted students correct		Non-gifted students wrong or no answer		Non-gifted students total	
	n	%	n	%	n	%	n	%	n	%	n	%
1)Expressing in the unusual way	65	85,5	11	14,5	76	100	57	62,6	33	36,3	90	100
2) Expressing in the unusual way	58	76,3	18	13,7	76	100	28	30,8	62	68,1	90	100
3) Expressing in the usual way	76	100	0	0	76	100	55	60,4	35	38,5	90	100
4) Expressing in the usual way	72	94,7	4	5,3	76	100	16	17,6	74	81,3	90	100

When Table 15 is examined, students that are gifted have reached the desired learning level of 75% in both questions (85.5% and 76.3%) of the sub-dimension of expressing the expression given in the renaming dimension of the place value unusually. In the sub-dimension of expressing the given expression differently, the students achieved the desired learning level in both questions (100% and 94.7%). Non-gifted students, on the other hand, were asked both in both questions (62.6% and 30.8%) of the sub-dimension of expressing the

expression given in the renaming dimension (62.6% and 30.8%), and both questions (60% and 17.6%) could not reach the desired learning level of 75%. Table 16 shows the errors related to the sub-dimensions of the renaming dimension of gifted students.

Table 16. *The Errors Made by the Fourth-Grade Gifted Students Regarding the Sub-dimensions of the "Rename" Dimension to Understand the place Value*

Sub dimensions	Questions	Error type	f	Error examples
Usual way	Which number represents 8 thousand + 7 tens + 3 ones?	Inability to realize that zero is a placeholder	4	"873"
Unusual way	1) 1 hundred, 6 tens, 7 ones makes: ……. tens ……… ones?	1) Failure to convert the expression corresponding to the verbal expression other than usual into a different expression	23	"167 tens 167 ones" "6 tens 7 ones"
	2) How many 100 ₺ is in 1200 ₺? Write and explain your answer.	2) Finding the numbers wrong by doing irrelevant / invalid transactions	6	"1200/100=121"

Gifted students that have not been able to realize that the renaming dimension of the place value in natural numbers are "unable to comprehend that zero is a placeholder in the sub-dimension of expressing the given expression in the usual way" 4. In the sub-dimension of expressing the given expression unconventionally, they made the error of "not being able to convert the expression corresponding to the unusual expression to a different expression" 23 and "finding the result wrong by making irrelevant/invalid transactions given" 6.

Reaching Levels and Mistakes Made in Comparison Dimension

Table 17 shows the achievement levels of gifted and non-gifted students regarding the sub-dimensions of the comparison dimension.

Table 17. *The Levels of Reaching the Behaviors Related to the Sub-dimensions of the "Comparison" Dimension of Fourth-Grade Students that are Gifted and Non-gifted*

Sub dimensions	Gifted students correct		Gifted students wrong or no answer		Gifted students total		Non-gifted students correct		Non-gifted students wrong or no answer		Non-gifted students total	
	n	%	n	%	n	%	n	%	n	%	n	%
1) Big	73	96,1	3	3,9	76	100	69	75,8	21	23,1	90	100
2) Between	74	97,4	2	2,6	76	100	45	49,5	45	49,5	90	100
3) Small	72	94,7	4	5,3	76	100	77	84,6	13	14,3	90	100

When Table 17 is analyzed, gifted students reached 75%, which is the desired level of learning, in all of the dimensions (94.7%). Their scores of comparison value of the places in natural numbers to "sort the numbers given from large to small" (96.1%), "find the number between the two numbers given" (97.4%), and "sort the numbers given from small to large." On the other hand, students that are non-gifted reach the desired level of learning in the sub-dimensions of "ranking the numbers given from large to small" (75.8%) and "sorting the numbers given from small to large" (84.6%), but they did not reach the desired level of learning under the sub-dimension of "finding the number between two numbers" (49.5%). Table 18 shows the errors of gifted students regarding the sub-dimensions of the comparison dimension.

Table 18. *The Errors Made by the Fourth-Grade Gifted Students Regarding the Sub-dimensions of the "Comparison" Dimension to Grasp the Value of the Place*

Sub dimensions	Questions	Error type	f	Error examples
Small	30400, 34000, 30404, 30004 Write the numbers given above in descending order.	Failure to sort the given numbers from small to large.	4	"30404,30400, 30004,34000"
Big	4800, 4080, 4000, 4008 Write the numbers given above from small to large.	Failure to sort the given numbers from large to small.	3	"4080<4800< 4008<4000"

When Table 18 is analyzed, it is seen that the gifted students make the errors of sorting given numbers from small to large 4 and sorting given numbers from small to large 3 in the comparison dimension of natural numbers.

Reaching Levels and Errors Related to the Calculation Dimension

Table 19 shows the achievement levels of gifted and non-gifted students regarding the sub-dimensions of the calculation dimension.

Table 19. *The Levels of Reaching the Behaviors Related to the Sub-dimensions of the "Comparison" Dimension of Fourth-Grade Students that are Gifted and Non-gifted*

Sub dimensions	Gifted students correct		Gifted students wrong or no answer		Gifted students total		Non-gifted students correct		Non-gifted student wrong or no answe		Non-gifted students total	
	n	%	n	%	n	%	n	%	n	%	n	%
Addition	75	98,7	1	1,3	76	100	85	90,1	8	8,8	90	100
Division	37	48,7	39	51,3	76	100	5	5,5	85	93,4	90	100
Subtraction	69	90,8	7	9,2	76	100	62	68,1	28	30,8	90	100
Multiply	69	90,8	7	9,2	76	100	52	57,1	38	41,8	90	100

When Table 19 is examined, the calculation dimension of the place value of the students that are gifted is "addition" (98.7%), "subtraction" (90.8%), and "multiplying" (90.8%). It was observed that they reached 75%, which is the desired level of learning, in its sub-dimensions. The students could not reach the desired level of learning in the sub-dimension of "division" (48.7%).

On the contrary, while the non-gifted students reach the desired level of learning under the sub-dimension of "addition" (90.1%), it was observed that they did not reach the desired level of learning under the sub-dimensions of "subtracting" (68.1%), "multiplication" (57.1%), and "division" (5.5%). Table 20 shows the errors of gifted students regarding the sub-dimensions of the calculation dimension.

Table 20. *The Errors Made by the Fourth-Grade Gifted students Regarding the Sub-dimensions of the "Calculation" Dimension to Grasp the Place Value*

Sub dimensions	Questions	Error type	f	Error examples
Addition	What is the result of the 3000 + 5 hundred collection process? Write your answer.	Adding the number to the wrong digit	1	"3000 + 5 = 3005"
Subtraction	400–27 =? Write your answer.	Not being able to break decimals	2	"400 − 27 = 363"
Multiply	With what number do I have to multiply the number 372 to get the number 37200? Write your answer.	Not being able to multiply a given number by ten and multiples of ten	5	"372 × 372 = 138084"
Division	4080:10 =? Write your answer. The result is what portion of the number 4080?	Failure to find the result of the operation and express the result in decimal	26	"4080 / 10 = 408, Namely one in a thousand"

When Table 20 is examined, gifted students made the error of "adding the number to the wrong digit" 1 in the sub-dimension of calculating the calculation dimension of the place value in natural numbers. In the sub-dimension of the subtraction process, the errors of "not being able to break decimal" 2 and "finding false results even though decimal breaking" 2 were made. In the sub-dimension of the multiplication process, the error of "not multiplying the given number by ten and its multiples" 5 was made. Dividing is the most common sub-dimension of the sub-dimension. In the sub-dimension of the division process, "not being able to find the process and expressing the result in decimal" 26, "forgetting the zero that is a placeholder in the dividing process" 7, "not being able to divide according to the given expression" 4, and "irrelevant answer" 1 errors were made. Some examples of errors are not included in Table 20.

4. Conclusion and Discussion

In the research, the levels of comprehension of the digits in the natural numbers of the gifted elementary school fourth-grade students diagnosed as gifted and non-gifted were examined according to dimensions. The levels

of counting, representing, naming, renaming, comparing, calculating, and on the sub-dimensions on gifted students are higher than the non-gifted students. The reason for this difference in achievement can be considered as the deepened education of gifted students at SAC after public school. In addition, the fact that the general abilities of gifted students are higher than their peers may affect this situation. It is seen that only on the counting dimension does the non-gifted students have a higher level of reaching the countdown sub-dimension than the gifted students. The reason for this can be said to be lower because gifted students do not pay attention to this question fully. When we look at the general average of success in the dimensions of the place value of the students, the gifted students have significantly higher than the general achievement average of the non-gifted students. Considering the average of success for each dimension of the place value, it can be concluded that gifted students in all dimensions (counting, representing, naming, renaming, comparing, and calculating) are higher than the non-gifted students. In another study (Yıldız, et al., 2012), it was found that gifted students used more strategies when solving problems than those who were non-gifted; as in this study, gifted students had a higher level of success. The reason for this can be considered as providing differentiated, enriched, and deepened education to gifted students (Çetin & Doğan, 2018; Yıldız, 2010).

According to the answers given by the gifted students to the applied questions, it was seen that among all sub-dimensions of the place value, gifted students did not reach the desired learning level (75%) in only three sub-dimensions, while non-gifted students could not reach the desired learning level (75%) in 11 sub-dimensions. Both gifted students and non-gifted students were found to be unable to reach the desired learning level of 75% in the sub-dimension of counting ten advanced in the counting dimension, in the sub-dimension of representing the given expression with non-standard representations, and in the division sub-dimension of the calculation dimension. When the answers of the students in both groups were examined for the ten counting forward sub-dimension, it can be said that they could not reach the desired learning level, especially because the concept of place value was not understood. For both groups of students, it can be said that they have difficulties in operations with non-standard representations, and they have difficulty in thinking differently because they are used to doing the questions by memorization and rules. In their article entitled "The relationship between mathematical creativity and intelligence: a study on gifted and general education students," Kahveci and Akgul (2019) reported that students with IQs above 130 who attend a special program score higher on measures of mathematics creativity than people with IQs below 130 who attend general education schools. However, in this study, there was no significant difference between the two groups in terms of creativity. Additionally, it can be said that students have difficulties because of using zero as a placeholder in dividing and the decimal form is not understood.

In studies on place value, the results showed that students have difficulty in understanding this subject in the researches about place value (Tosun, 2011). The reason for the difficulties with the numbers is the place value (Arslan, Yıldız, & Yavuz, 2011). Although they know the place value of the students, they cannot fully construct the place value (Kaplan, 2008), and students have misconceptions about the place value (Dinç-Artut & Tarım, 2006). This research also revealed that students have some mistakes about the place value as in the results of the literature. There is no study in which gifted primary school students' value comprehension levels are evaluated according to their dimensions and sub-dimensions in the literature. Although there is no other research about the size and sub-dimensions of the place value, except for Paydar (2018)'s work in public schools, there are studies on the mistakes made about the place value. In the research, reducing the place value to the majority, ignoring the placeholding of zero, writing the numerical values of the representations, and drawing missing representations, especially non-standard representations, are drawn in a complex order; and the unusual representations cannot be created with the digit order, the result of the operation cannot be expressed as a decimal, and forgetting the placeholder zero in the compartment are the most common errors of gifted students. These errors are similar to the study results in previous literature (Bingölbali & Özmantar, 2015; Çite, 2016; Özmen, 2017; Paydar, 2018; Tosun, 2011). Gifted students made very few mistakes in sub-dimensions such as addition, subtraction, multiplication, reading and writing the number, and comparing numbers. In the researches in the literature, the results of the students' forgetting to add on the side number in the four transactions and not being able to break the decade (Önal, 2018; Özmen, 2017; Sidekli, Gökbulut, & Sayar, 2013) were the least common types of errors in this study. The fact that these types of errors mentioned in the literature are much less in the study shows that gifted students have better operational knowledge than non-gifted students. It is thought that these errors, which are rarely seen in students' answers, may be because of a lack of operational knowledge rather than a lack of operational information. In the light

of all this information, when the students frequently making mistakes are examined, it can be said that their conceptual knowledge about the place value is weaker and the operational knowledge is stronger. In this situation, it can be said that students try to solve the questions by using the operational knowledge, but the mistakes are caused by the inadequacy of associating the conceptual knowledge (Bingölbali, Arslan, & Zembat, 2016). This finding is in line with the finding that the students' conceptual knowledge about place value is weaker in the study of Paydar and Sarı (2019). Bingölbali and Özmantar (2015) stated that students have difficulties in using the place value in relational use; Rogers (2014) stated that teaching strategies are used limitedly in teaching the place value subject, and the place value subject is covered superficially. One of the most error-made dimensions is the representation dimension. The fact that gifted students have weaker conceptual knowledge, especially having difficulties in establishing structure and relationship outside of the standard unit (as seen in the expression dimension with non-standard representations), may not be considered as a reason for not linking curriculum, teaching strategies, and conceptual and operational knowledge together. Although there are many mistakes in the expression with standard representations section, the number of errors with non-standard representations is higher. It was concluded that there were difficulties in representation and modeling with the studies conducted in similar research (Aztekin & Şener, 2015; Güneş, Gülçiçek, & Bağcı, 2004; İpek & Okumuş, 2012; Paydar, 2018; Tuna, Biber & Yurt, 2013). Studies have concluded that representations are effective in learning (Çiltaş & Muşlu, 2016; Pilten, Serin, & Işık, 2016). In his study, Özdemir (2008) concluded that teacher candidates had difficulty in establishing a relationship with the material and could not comprehend what the materials were used to make sense of mathematical concepts. Considering the error made about expression with standard representations, which we can consider as a semi-abstract form of place value, performing more in-depth, broad content and relational teaching activities can reduce the types of errors and reduce the number of errors in non-standard representations. After all, non-standard semi-abstract symbols and unusual, relational activities can be included. To minimize errors and contribute to the students' meaningful learning, it may be beneficial to provide enormously enriched and relational learning environments to minimize errors regarding the place value, which is a prerequisite for other subjects of mathematics. In the experimental study conducted on the development of place value comprehension of the third-grade students of primary school carried out by Mutlu and Sarı (2019), it was observed that computer-aided educational materials improved students' understanding of place value. Hendrawan and Nurkamilah (2020) concluded that elementary school second-grade students understand the concept of place value better with flash CS6 activities in their study. For this reason, it can be suggested to give the concept of place value to students with technology support especially in the first years of primary school.

In the study in which Paydar, Doğan, and Şahin (2019) examined the readiness levels of primary school first-grade students for natural numbers, it was observed that students had the necessary skills to prepare for counting, while they understand the concepts of natural numbers and place value as they got older. It is considered that when the conceptual and operational aspects of the step concept will be given to enrich these trainings to be given by taking into consideration their readiness according to the grade level and to make the step concept meaningful.

Houdement and Tempier (2018) stated that only the positions of the digits are specified regarding the place value, and the relationship between each digit of the number is neglected. They stated that primary school teachers are not aware of the effect of place value on mathematics education and that the core of teacher education is place value. They also stated that the place value makes the relationships among decimals, calculation, and measurement units are visible. Thanheiser and Melhuish (2019) stated that teachers are adept at using the rules of addition and subtraction, but they are unaware of the basic features that require understanding the base ten place value system. All these show that it would be beneficial to enrich the content of teacher training to understand the place value semantically.

5. Recommendations

According to these results, the following suggestions can be made for place values and sub-dimensions.

✓ It may be useful to teach all the dimensions of the place value relationally so that they can embody the place value teaching enough for the students and understand the meaning of the place value.

- ✓ Because students need to understand the concept of place value at an early age, education can be enriched especially with the help of technology-supported teaching processes.
- ✓ Experimental studies on counting, representing, naming, renaming, comparing, and calculating dimensions can be carried out while constructing students' concept of digits.
- ✓ By monitoring the teaching processes, studies can be conducted on the extent to which teachers reveal the opportunities for relational understanding.

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Examining the Relationship between the Fear of COVID-19, Resilience and Religion

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ARTICLE INFO	ABSTRACT
	The relationship of fear of COVID-19, resilience, and religiosity in the COVID-19 Global Pandemic, which affects life in many areas of psychological, social, economic, cultural, religious, has been examined in this study. In this study, 337 people, including 219 women (65%) and 118 men (35%), participated. The present research was a descriptively based quantitative study based on the relational survey model. COVID-19 Fear Scale, Brief Resilience Scale and Religiosity Scale were used to collect data. In addition, a Personal Information Form was used to obtain information and opinions about COVID-19 and determine demographic characteristics. The t-test, correlation and regression analysis were used in statistical processes. The findings obtained in this research showed that women have more fear of COVID-19 than men, and men have higher resilience and religiosity scores than women. In addition, it was observed that there was a significant and negative relationship between the fear of COVID-19 and resilience, religiosity and age, a significant and positive relationship between resilience and religiosity and age, and a significant and positive relationship between religiosity and age. Finally, it was found that resilience, religiosity and age together were predictors of COVID-19 fear. However, when looking at the t-test results of the significance of the regression coefficients, it was seen that only resilience was a significant predictor of COVID-19 fear. The findings obtained are discussed in light of the literature. Keywords: Resilience, religion, fear of COVID-19, pandemic, health.

1. Introduction

It was reported to the World Health Organization (WHO) that unusual cases of pneumonia were seen on December 31, 2019, in Wuhan, Hubei province of China, and it was understood that a virus belonging to the Corona family caused diseases. This virus is named SARS-CoV-2, and the disease is named COVID-19. It spread many countries, such as Japan, Russia, Spain and England within a month and caused deaths. To prevent this spread, restrictions were made around the world and the Global Pandemic was declared in March 2020. March 11, 2020. Date of seen the first Covidien-19 cases in Turkey, followed by the holidays, schools, public events and public worship are prohibited, travel restrictions have been introduced, has begun to flexible working practices in the public and brought the curfew at various times. As of May 2020, the restrictions were lifted in a controlled manner and the transition to a controlled normal life was started in June (TÜBA, 2020).

The data in this study were collected during November 2020, that is, during the normalization process when not only the number of cases but the number of patients were announced and the dates for vaccination applications were not determined. During these days, the number of daily patients in our country is

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approximately 2000, the number of deaths is 70; it was announced that the total number of patients was approximately 360,000 and the number of deaths was 9800. As of December 22, there were of 2,062,960 cases, 18,602 deaths in our country. In the world, 77,856,238 cases and 1,715,749 deaths were seen (Worldometer, 2020). These figures show the rapid spread of the pandemic in our country and globally.

It is seen that this global pandemic is effective in social, psychological, economic, political, cultural and ecological areas as well as human health. Thus, states have been working on preventing, slowing down and controlling the pandemic, and have given importance to developing vaccines and drugs since the emergence of the virus. In addition to vaccine and drug studies, the psychological effects of the pandemic are also being investigated. Situations, such as inability to work due to pandemic, physical distance, isolation, uncertainty, being infected, and losing relatives may have a negative effect on people's psychology, cause secondary psychiatric disorders or exacerbation of primary psychiatric disorders (Bhuiyan, Sakib, Pakpour, Griffiths & Mamun, 2020; Brooks et al., 2020; Lima et al., 2020; Okur & Demirel, 2020; Sofuoğlu- Kılıç, 2020). It is thought that stress caused by COVID-19 affects problems, such as depression, anxiety, and somatization at different levels (Arslan & Yıldırım, 2020; Gunnell et al., 2020; Satici, Kayis, Satici, Griffiths, & Can, 2020). After this difficult process brought about by the pandemic, the concept of resilience, which means the ability to survive, to recover, to be in harmony, to overcome problems (Garmezy, 1993; Masten, 2014). Although there is no complete consensus in explaining the concept of resilience, some generally accepted concepts are used. The first of these concepts is the risk factor. It is defined as factors that increase the probability of a negative result to occur or cause an existing problem to continue (Kirby & Fraser, 1997). The emphasis here is to have or experience a risk factor to talk about the concept of resilience (Masten, 2014). Disability, loss of parents, exposure to natural disasters or health problems can be expressed as risk factors. In this study, COVID-19 Global Pandemic has been accepted as a risk factor. The pandemic does not only affect the infected people or their relatives but also affects other individuals in the society psychologically (Arslan, Yıldırım, Tanhan, invention, & Allen, 2020; Kasapoğlu, 2020). The concept that reduces the effects of the risk factor in the resilience or helps to cope with the risk factor is protective factors (Bonanno, 2005; Masten, 2014). These protective factors sometimes include external characteristics, such as family, school, or adult support. It can also include personal characteristics, such as intelligence, temperament, character, optimism and hope (Graber, Pichon, & Carabine, 2015; Pieloch, McCullough, & Marks, 2016). When these dimensions are brought together, the concept of resilience can be expressed as the ability of the individual to survive and recover with the effect of the protective factors he/she has despite the risk factors in his life.

Another important point that closely concerns both the social life and daily life of people is the individual's religious beliefs and activities. Religiosity is also defined as the level of preoccupation with the interest, belief or activities of the religion to which an individual belongs (Himmelfarb, 1975). There are different definitions of religiosity in the literature. In some other definitions, religiosity is defined in different ways, such as the subjective expression of the individual's attachment to the religious structure (Subaşı, 2002), the individual's expression of the relationship with the sacred entity or object, continuing, transforming or seeking identification (Cirhinlioğlu, 2010).

This study aims to examine the relationship between religiosity, resilience and fear of COVID-19. In addition, the descriptive views of the participants on the pandemic process and its effects were examined within the other scope of the study.

2. Method

2.1. Research Model

The research was a quantitative study based on the relational model. The purpose of this model is to describe the relationship between two or more variables, to make inferences about cause-effect or predictability (Büyüköztürk, Çakmak, Akgün, Karadeniz, & Demirel, 2018)

2.2. Study Group

The data were obtained from participants between the ages of 18-73 with a mean age of 29.9. The questionnaire forms were collected using electronic form due to the pandemic, and the appropriate sampling method was

used. The data of 44 people out of 398 who participated in this study were excluded from this study with the control item. In addition, data belonging to 17 people who were out of the score range of ± 3.290 and accepted as extreme values as a result of converting the scale items to Z standard score were not included in the study. Data analysis was made with the results of the remaining 337 people.

2.3. Data Collection Tools

2.3.1. Personal Information Form: It was developed by researchers to determine the demographic characteristics of the participants, such as age and gender and to obtain their views on COVID-19.

2.3.2. Fear of COVID-19 Scale: Ahorsu et al. (2020) in Iranian culture, the scale was adapted to Turkish culture by Satici, Gocet- Tekin, Deniz and Satici (2020). The scale consisting of one-dimensional seven items is prepared as a five-point Likert. Internal consistency coefficient as $\alpha = 0.82$ calculated. Item-total correlation is between 0.47 and 0.56, factor load values are between 0.66 and 0.74. As a result of the confirmatory factor analysis (CFA) performed in the adaptation studies, it was seen that the scale had acceptable fit indices [χ^2 (13, N = 1304) = 299.47, p <.05; SRMR = .061; GFI = .936; NFI = .912; IFI = .915; CFI = .915]. Satisfaction with Life Scale and Depression, Stress, Anxiety Scale were used for criterion validity. A negative significant relationship between COVID-19 Fear Scale and Life Satisfaction Scale (r = −0.20, p <.001); A positive and significant relationship was found with the dimensions of depression (r = 0.38, p <.001), stress (r = 0.47, p <.001) and anxiety (r = 0.55, p <.001). Cronbach's alpha ($\alpha = 0.847$), Guttmann's lambda ($\lambda 6 = 0.844$) and McDonald's Omega (= 0.849) values were obtained in the reliability analysis. As a result of the CFA performed in this study, the goodness of fit values were found as $\chi^2 = 17.587$ sd = 11 ($\chi^2/df = 1.60$), AGFI = 0.95, GFI = 0.98, CFI = 0.99, RMSEA = 0.057 and RMR = 0.025. The Cronbach's alpha value was 0.86, and the item-total correlation varied between 0.60 and 0.72, and as a result of the analysis, the scale was valid and reliable.

2.3.3. Brief Religiosity Scale: The scale developed by Ayten (2009) consists of ten items and two sub-dimensions: belief-effect and knowledge-worship. The belief-effect dimension consists of six items related to the reflection of belief on the social life of the person, its effect on prosocial behavior, and the measurement of attitudes and behaviors in this direction. The knowledge-worship dimension consists of four items that measure the continuity of worshiping and the level of knowledge about religious life. The scale was developed as a four-point Likert, but later it was made a five-point Likert (Ayten & Yıldız, 2016). The psychometric values of the scale are as follows: KMO value (0.83), Bartlett's Test of Sphericity value ($\chi^2 = 2325.27$; p = 000); Cronbach's alpha values scale general $\alpha = 0.89$, belief-effect dimension (fac-1) $\alpha = 0.86$, knowledge-worship dimension (fac-2) $\alpha = 0.77$. As a result of the CFA performed in this study, the goodness of fit values were found as $\chi^2 = 76.983$, df = 33 ($\chi^2 / df = 2.333$) AGFI = 0.92, GFI = 0.95, CFI = 0.97, RMSEA = 0.063 and RMR = 0.034. Cronbach's alpha internal consistency value is general = 0.88, belief-effect = 0.86, knowledge-worship = 0.77; item-total correlation ranged from 0.43 to 0.70 in general, belief-effect sub-dimension between 0.47 and 0.72, knowledge-worship sub-dimension between 0.48 and 0.74.

2.3.4. Brief Resilience Scale: The scale, developed by Smith et al. (2008) and adapted to Turkish culture by Doğan (2015), consists of six items of five-point likert type. In the exploratory factor analysis (EFA) made in the adaptation phase, it was found that the single dimension of the scale explained 54% of the total variance, and the factor load values were between 0.63 and 0.79. According to the CFA results, the goodness of fit values of the scale ($x2/df$ (12.86/7) = 1.83, NFI = 0.99, NNFI = 0.99, CFI = 0.99, IFI = 0.99, RFI = 0.97, GFI = 0.99, AGFI = 0.96, RMSEA = 0.05, SRMR = 0.03. Cronbach's alpha internal consistency coefficient was 0.83. As a result of the CFA performed in this study, the goodness of fit values were $\chi^2 = 16.921$, df = 8.031 ($\chi^2/df = 2.115$), AGFI = 0.96, GFI = 0.98, CFI = 0.99, RMSEA = 0.058. and RMR = 0.042. Cronbach's alpha value was 0.86, and item-total correlation varied between 0.56 and 0.69, and as a result of the analysis, it was concluded that the scale was valid and reliable.

2.4. Analysis of Data and Ethical Approval

Platform for Scientific Research from the Ministry of Health of the Republic of Turkey and Bolu Abant Izzet Baysal University Human Research in Social Sciences Ethics Committee approval was obtained. The data were collected in electronic form. SPSS 24 and AMOS 20 package programs were used for statistical analysis. The skewness and kurtosis coefficients of the COVID-19 Fear Scale, the Brief Resilience Scale and the Brief Religiosity Scale were examined to see if they showed a normal distribution. According to the skewness and

kurtosis values, it was concluded that the data showed n normal distribution. Then, independent sample t-test, Pearson correlation, multiple regression analysis were performed.

3. Findings

The answers to some questions asked to obtain individuals' opinions about the COVID-19 pandemic are presented in Table 1.

Tablo 1. *Descriptive Results for Participants*

Variables	Sub Categories	N	Percent (%)
Gender	Famale	219	65
	Male	118	35
How has your /your family's economic situation changed since the beginning of the pandemic?	Stable	218	64,7
	Got worse	109	32,3
	Got better	10	3
Have you been COVID-19 positive?	Yes	27	8
	No	310	92
Have people you consider important (e.g., family and friends) been COVID-19 positive?	Yes	222	65,9
	No	115	34,1
Has anybody (e.g., family and friends) whom you consider important lost their lives due to COVID-19?	Yes	60	17,8
	No	277	82,2
Which statement is more appropriate about your diet in the pandemic?	My diet has never changed.	116	34,4
	My diet has changed a little.	165	49
	My diet has changed completely.	56	16,6
Which statement about your sleep pattern in the pandemic is more appropriate for you?	My sleep has not changed.	129	38,3
	My sleep has changed a little.	142	42,1
	My sleep has completely changed.	66	19,6
Do you think you have got the accurate information about the pandemic?	Yes	158	46,9
	No	179	53,1
Which of the following statements regarding the rules defined as "mask-social distance-hygiene" in the fight against COVID-19 is more correct for you?	I've been following these rules since the beginning of the pandemic.	261	77,4
	I was following the rules in the early stages of the pandemic. But with normalization, I have given up following the rules.	64	19
	I have barely obeyed the rules since the beginning of the pandemic.	12	3,6
Which statement about the COVID-19 pandemic is more correct for you?	COVID-19 is a biological weapon produced in a laboratory environment.	165	49
	COVID-19 is a highly contagious virus that has emerged naturally like other viruses.	114	33,8
	COVID-19 can be explained by religious and sacred reasons.	33	9,8
	It is the mechanism of nature to protect itself against human destruction.	17	5
	Other reasons	8	2,4

It was aimed to examine whether there was a significant difference between the scores obtained from the religiousness, resilience and fear of the COVID-19 scale regarding the gender variable. In this context, it was examined whether the scale scores showed normal distribution with skewness and kurtosis coefficients, and the findings obtained are given in Table 2.

Tablo 2. *Skewness and Kurtosis Results according to Scores Obtained from the Fear of COVID-19 Scale, Brief Religiosity Scale and Brief Resilience Scale by Gender*

Veriables	Sub-categories	X	Sd	Median	Skewness	Kurtosis
Fear of COVID-19	Female	18,91	5,60	19	-,197	-,734
	Male	16,45	5,53	16	,225	-,691
Religiosity	Famale	39,84	6,42	41	-,829	,150
	Male	42,82	6,66	45	-1,209	,724
Resilience	Female	18,14	4,26	19	-,588	,334
	Male	20,26	4,53	20	-,096	-,172

When the skewness and kurtosis coefficients in Table 2 were examined, it was seen that the total scores of the scale were in the range of ± 1 according to the gender variable. It was seen that only in the male category of religiousness score, the value of skewness had a value other than -1. For a normal distribution, the coefficients of skewness and kurtosis in the range of ± 1 are considered sufficient (Büyüköztürk, 2010; Çokluk, Şekercioğlu, & Büyüköztürk, 2016). In addition, if the number of participants increases, it is accepted that the skewness and kurtosis coefficients for the normal distribution are in the range of ± 2 (George & Mallery, 2011; Kline, 2005). When evaluated from this point of view, it was accepted that the scale total scores had a normal distribution according to the gender variable. Thus, the t-test, one of the parametric techniques, was used to determine the difference in scale scores according to gender. The t-test results for fear of COVID-19, psychological resilience and religiosity scores regarding the gender variable are presented in Table 3.

Tablo 3. *t-Test Results for Fear of COVID-19, Religiosity and Resilience Scores by Gender*

Variables	Sub-categories	N	X	Sd	df	t	p
Fear of COVID-19	Female	219	18,91	5,60	335	3,85	,000
	Male	118	16,45	5,53			
Religiosity	Female	219	39,84	6,42	335	-4,26	,000
	Male	118	42,82	6,66			
Resilience	Female	219	18,14	4,26	335	-4,001	,000
	Male	118	20,26	4,53			

As shown in Table 3, the scores obtained from the Fear of COVID-19, Religiosity and Resilience Scales differed significantly according to gender. Female participants (X = 18.91) had a higher fear of COVID-19 score than male participants (X = 16.45). Male participants (X = 42.82) had a higher religiousness score than female participants (X = 39.84). In addition, male participants (X = 20.26) had higher resilience scores than female participants (X = 18.14).

Tablo 4. *The Correlation Results between Fear of COVID-19, Resilience, Religiosity and Age*

Variables	Fear of COVID-19	Resilience	Religiosity	Age
Fear of COVID-19	-	-,395*	-,152*	-,143*
Resilience	-,395*	-	,174*	,246*
Religiosity	-,152*	,174*	-	,479*
Age	-,143*	,246*	,479*	-

*p<.01

When Table 4 is examined, negative and moderate relationship between fear of COVID-19 and resilience (r = -0.395, p <.01), negative and low relationship with religiosity (r = -0.152, p <.01), negative and low with age relationship (r = -0.143, p <.01) were seen. In this case, it can be said that the fear of COVID-19 decreases as endurance, religiosity or age increases. When the relationships of other variables with each other were examined, it was seen that resilience was positively and slightly correlated with religiosity (r = 0.174, p <.01) and age (r = 0.246, p <.01). Accordingly, when the level of religiosity or age increased, so did resilience. In addition, it was seen that there was a positive and moderate relationship between religiosity and age (r = 0.479, p <.01). Thus, it can be said that as age increased, religiosity also increased.

The results of the regression analysis regarding the prediction of the fear of COVID-19 according to the variables of resilience, religiosity and age, which are seen to be related to the fear of COVID-19, are given in Table 5.

Tablo 5. *Results of Multiple Regression Analysis Predicting COVID-19 Fear*

Veriables	B	Standart Error_B	β	T	p	Binary-r	Partial-r
Constant	30,128	2,022	-	14,898	,000	-	-
Resilience	-,481	,066	-,378	-7,298	,000	-,395	-,371
Religiosity	-,069	,049	-,080	-1,404	,161	-,152	-,077
Age	-,006	,028	-012	-,202	,840	-,143	-,011
R= ,404	R²= ,163						
F_(3, 333)=	P = ,000						

When the binary and partial correlations in Table 5 were examined, there was a negative and moderate relationship (r =-, 395) between resilience and fear of COVID-19. When other variables are controlled, the correlation value between the two variables slightly reduced and r =-, 371 seemed to be. It can be said that there was a negative and low level of relationship (r = -152) between religiosity and fear of COVID-19, and a much lower relationship (r = -, 077) when other variables are controlled. There was a negative and low level correlation (r = -, 143) between age and the fear of COVID-19. When other variables were controlled, this relationship was r = - .011.

As shown in Table 5, resilience, religiosity and age variables together predicted the fear of COVID-19, these three variables together explained 16.3% of the fear of COVID-19. In addition, according to the standardized regression coefficient (β), it can be said that the relative importance order of predictor variables on fear of COVID-19 was resilience, religiosity and age. However, when examining the t-test results of the significance of the regression coefficients, it was seen that only psychological resilience was a significant predictor of COVID-19 fear. It can be said that religiosity and age variables are not significant predictors of fear of COVID-19.

4. Conclusion and Discussion

Pandemics have important psychological effects in terms of creating an environment of uncertainty and causing many changes in people's lives with measures such as quarantine and isolation. Erdogan and Hocaoğlu (2020), citing the studies on the psychiatric consequences of pandemics, stated that the pandemic is related to symptoms, such as anxiety, anger, post-traumatic stress symptoms, insomnia and loneliness. The COVID-19 pandemic also causes a decrease in people's positive emotions and an increase in their negative emotions (Li et al., 2020).

In this study, the relationship between the participants' thoughts on the pandemic and the fear of COVID-19, religiosity and psychological resilience was examined. When the results obtained from the questions asked to the participants for this purpose were examined, 109 people (32.3%) stated that their economic conditions had deteriorated since the beginning of the pandemic. In this study, 8% of the participants stated that they and 65.9% of their relatives, such as family and friends, are COVID-19 positive; 17.8% of them stated that their relatives died due to COVID-19.

The pandemic process causes changes in the daily routines of individuals. Participants stated that there was a change in diet (65.6%) and sleep patterns (61.7%). In a study conducted in the first period of the pandemic, it is seen that these routines have changed more (Altundağ, 2021). In this case, it can be said that people have adapted to the epidemic and started to return to their routines. Changes in nutrition and sleep patterns cause disturbances in the daily life of the person, motivation, focus problems, and negativities such as anxiety and depression (Pandi-Perumal et al., 2020; Yu et al.2017; Zahra, Ford, & Jodrell, 2014). Thus, it is important for individuals to maintain their daily routines in terms of health.

Accessing the accurate information during the pandemic process can be effective in reducing uncertainties. Hence, the participants were asked about their opinions on reaching the correct information. 53.1% of the participants think that they have not reached the accurate information. In the first periods of the epidemic, this rate is seen to be 25.8% (Altundağ, 2021). This situation can be interpreted as decreasing the trust of individuals in information providers. Fast and secure information sharing of official sources will also help people take action against the pandemic. Participants were asked about their compliance with masks, social distance and hygiene rules, which are considered the basic means of protection against the COVID-19

pandemic. A significant portion of the participants (77.4%) state that they have followed the basic protection rules from the beginning of the pandemic. In another study, it was found that individuals in Turkish society frequently use these basic protection methods (Kaplan, Sevinç & İşbilen, 2020).

Opinions regarding the cause of COVID-19 were received. Approximately half of the participants (49%) think that the virus is a biological weapon produced in the laboratory, 33.8% occurs naturally, 5% think that nature is a self-protection mechanism against destruction. 9.8% explain it for religious reasons. Similar answers were obtained in another study. 30.6% stated that there was a political or economic global manipulation behind the epidemic, 22% stated that there was a natural epidemic, 26% was a divine test, and 9.5% stated that it was divine punishment (Kaplan, Sevinç and İşbilen, 2020). In the research of Kımter (2020), 45.70% of individuals described COVID-19 as the test of God and 3.26% as God's punishment of people, while 31.45% of them were human-made biological weapons, 19.60% think it is a naturally occurring disease. In the study conducted by Küçükcan and Köse (2000) after the 17 August earthquake, it was seen that the participants used concepts, such as God's work, warning, test, punishment, fate or fault breaking, natural event, nature's revenge while explaining the earthquake. Participants who explain the natural disaster for religious reasons see the earthquake as a punishment (22%) and a warning (16%).

When the change of COVID-19 fear, religiosity and resilience by gender was examined, it was found that the fear of COVID-19 was more in women. This finding is compatible with previous studies (Altundağ, 2021; Arpacıoğlu, Baltacı and Ünübol, 2021; Bitan et al., 2020; Broche-Pérez, Fernández-Fleites, Jiménez-Puig, Fernández-Castillo and Rodríguez-Martin, 2020; Fitzpatrick, Harris & Drawve, 2020). This is consistent with studies that state that women experience psychological effects, such as stress, anxiety and depression caused by the COVID-19 pandemic more intensely (Liu et al., 2020; Rossi et al., 2020). When the level of religiosity is examined, it is seen that men are more religious. In some of the studies conducted in our country, women (Ayten, 2012; Baynal, 2015; Coştu, 2011; Çetin, 2010; Kalgı, 2020; Kımter & Köftegül, 2017; Öztürk, 2017; Uysal, 2015; Uysal & Turan, 2019; Yapıcı, 2013) some of them find that men (Kandemir, 2020; Turan, 2017; Yapıcı, 2006; Yıldız, 2014) are more religious, while in some studies there is no significant difference (Kızılgeçit, 2011; Korkmaz, 2018; Uysal, 2016; Yıldız- Türker, 2018) is seen. In meta-analysis studies about religiosity, different results were encountered, such as that there is no significant difference in religiosity according to gender (Yapıcı, 2012), differentiation is not strong (Yapıcı, 2016), and women are more religious (Korkmaz, 2020). Differentiation of resilience by gender is in favor of men. In other words, the resilience level of men is higher than women. In some of the previous studies, as in our research, it has been observed that men have higher resilience than women (Açıkgöz, 2016; Aydın, Öncü, Akbulut, & Küçükkılıç, 2019; Deniz et al., 2020; Erkoç & Danış , 2020; Karakış, 2019; Kımter, 2020; Sezgin, 2016; Taşkın et al., 2017; Yazıcı- Çelebi, 2020;), and in some, women than men (Atan & Ünver, 2019; Çutuk, Beyleroğlu , Hazar, Akkuş Çutuk, & Bezci, 2017; Durmuş & Okanlı, 2018; Kılıç 2014; Koç Yıldırım, Yıldırım, Otrar, and Şirin, 2015; Oktan, Odacı, and Berber-Çelik 2014; Özden, 2015; Tonbül, 2020). There are also studies showing that there is no difference in resilience level by gender (Akça, 2012; Alkım, Arı et al., 2020; Aydın, 2010; Aydın & Egemberdiyeva, 2018; Aydoğdu, 2013; Bektaş & Özben, 2016; Bolat 2013; Can & Cantez, 2018; Dursun & Özkan, 2019; Fingerless, 2019; Işık, & Çelik, 2020; Karal & Biçer, 2020; Karaırmak, & Güloğlu, 2014; Özer, 2013; Özkapu, 2019; Yıldız-Türker, 2018). The reason for the lower level of resilience of women is shown to be that women have more roles in society compared to men, this situation brings more difficulties for them and women to have a more emotional structure (Aydın, Öncü, Akbulut, & Küçükkılıç, 2019).

Correlations between the variables of fear of COVID-19, psychological resilience, religiosity and age were examined. In the findings obtained, there was a negative relationship between resilience, religiosity or age and the fear of COVID-19. In addition, a positive correlation was found between religiosity, resilience and age. Accordingly, it can be said that people who have high strength to resist and recover against difficulties are less afraid of the virus. In addition, it is seen that as the age increases, the fear of COVID-19 will decrease. Although the physical discomfort and deaths resulting from COVID-19 are more in the elderly, the fear of COVID-19 is lower. This result may be due to the increase in resilience and the increase in the level of religiosity, which seems to be associated with resilience with increasing age. Because according to the partial correlation results, it is seen that the relationship between age and fear of COVID-19 is not significant when the resilience and religiosity variable is controlled. In addition, given that a significant portion of the participants in this study consisted of young individuals, this may have led to this conclusion. In this study,

it is seen that with the increase in religiosity, resilience also increases (r = 0.174, p <.01). Similar results are observed in studies dealing with resilience and religiosity in our country (Atan & Ünver, 2019; Erdoğan, 2015; Koç, 2004; Korkmaz, 2018; Sezgin, 2016; Yağbasanlar, 2018). Kımter (2020), who investigated resilience according to the subjective perception of religiosity, also concluded that the level of resilience of non-religious people is lower than those who are slightly religious, religious, highly religious and highly religious. In addition, it has been observed that "those who pray and worship regularly" have higher resilience. With these findings, it can be concluded that religious beliefs and practices can be a source of power in dealing with difficult situations.

The last finding in the study is the predictive effect of resilience, religiosity and age on the fear of COVID-19. Together, these variables explain 16.3% of COVID-19 fear. However, it is seen that religiosity and age variables are not significant predictors of COVID-19 fear. In a new study, it is seen that religiosity has an indirect effect on resilience on anxiety in the COVID-19 process. However, resilience appears to have a negative effect, both directly and indirectly (Kasapoğlu, 2020). Similarly, in another model study, it was found that resilience was directly or indirectly effective on fear of COVID-19 and directly on subjective well-being (Satici et al., 2020). It was also reported in another study that resilience had a predictive effect on the fear of COVID-19. According to the results of this study conducted in the first period of the pandemic, 19% of the change in the scores related to the fear of COVID-19 is explained by resilience (Altundag, 2021). According to these findings, psychological resilience appears to be a protective factor for fear of COVID-19. Thus, there is a need for further studies and practices that will increase psychological resilience.

There are some limitations to the study. One of the limitations of this study is that this study was conducted in a normal population and not on patients or their relatives. Thus, it is not correct to generalize the findings obtained to clinical cases. Apart from that, study data were collected with scales based on self-expression. The collection of data electronically due to pandemic conditions can be considered another limitation. Conducting qualitative based studies related to the subject will contribute to a better understanding of research phenomena.

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The Effects of Authentic Learning Approach on Academic Achievement and Attitudes in Social Studies Course*

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ARTICLE INFO	ABSTRACT
	In this study, the effects of the authentic learning approach in social studies on academic achievement, retention of knowledge, and attitude towards the course were investigated. In the study, a quasi-experimental pre-test-post-test design with a non-equivalent control group was used. The study group consisted of 50 6th grade students. In the process, the authentic learning approach was used in the experimental and control group, the texts and instructions given in the course book were followed. The study data were collected by the "Social Studies Course Academic Achievement Test" and "Social Studies Course Attitude Scale". As a result of the experimental process, it was obtained that the academic achievement levels of the students in the experimental and control groups in the social studies course increased and differed significantly compared to the pre-experimental process. It was observed that the measurement results in the follow-up studies conducted five weeks after the measurement after the application did not differ significantly from the post-test scores of the students in the control and experimental groups. The difference between the achievement test scores of both groups was significant, favouring the students in the experimental group. The changes in the attitudes of the students in the control group towards the social studies course were not found to be significant when compared to the pre-experimental process, while the changes in the attitudes of the students in the experimental group were significant. While there was no significant difference between the pre-test attitude scores of the students in the experimental and control groups, a significant difference was found between the post-test attitude scores favouring the experimental group. In this respect, the authentic learning approach has created an important alternative to methods based on knowledge transfer. In addition, it was observed that the authentic learning approach positively changed students' attitudes towards the course. © 2021 IJPES. All rights reserved Keywords: Achievement test, attitude, authentic learning, retention, social studies.

1. Introduction

The rapid changes experienced in production and access to knowledge inevitably necessitated a change in the educational field. Based on this, information turned into a living organism rather than being a ready-made and packaged product (Ministry of National Education [MoNE], 2018a, p. 22). This situation has changed the traditional roles of students, teachers, and the school environment. Based on this, students are no longer individuals who only take, memorise, store information, and repeat it when asked. On the contrary, students are expected to access information with their own efforts, to verify the information they have obtained through a literacy filter, to associate them with daily life contexts, to solve problems they encounter by transferring

them to different situations, and thus to be individuals equipped with 21st-century skills. In the new understanding of education, teachers consider the differences between students as a natural richness and act as guides who strive to reveal the student's capabilities (MoNE, 2018a, p. 21). According to Rousseau, a good teacher does not teach students the principles and the ways of acting; but tries to make them find themselves, just like Socrates. In this respect, teachers should organise their lessons based on experience rather than instruction (Günay, 2018, p. 94). On the other hand, schools should be a part of life rather than an artificial world surrounded by four walls and isolated from its environment and society. Additionally, schools should be places where students are prepared to solve the difficulties of life (Laur, 2013, p. 13). As can be understood, a new understanding of education is emphasised for learners to acquire the skills required to cope with the challenges of the 21st century. As in other countries worldwide, it has become a crucial issue in Turkey to transform society through education. As a result, curriculum studies have gained momentum in Turkey. According to the constructivist approach, the new curriculum was launched in 2004 to solve the problems raised by the artificiality of traditional programs. The new curriculum has been updated several times following the new requirements, and in 2018 some changes were added to the new curriculum. The new curriculum aims to make major changes in all subject areas and student-centeredness, encouraging active engagement of learners and providing a learning environment in which research, discovery, and cooperation are emphasised (Ocak & Karafil, 2021). Additionally, it is stated in the new curriculum that it has become one of the most important educational goals of the developed countries to equip the students with the ability of developing innovative solutions to the problems they encounter in their environment from an early age and producing these solutions by blending them with different disciplines (MoNE, 2018a, p. 72).

When the literature is examined, it is seen that the importance of contemporary approaches and educational understanding are regarded as key factors. On this issue, Lombardi (2007, p. 2) stated that solving real-world problems motivates students. In addition, the majority of educators agree that learning by experience is more effective than learning by listening or observing. Educational theories and research studies support this claim (Pearce, 2016, p. 1). According to Dewey (2008, p. 40), students are all unique learners and differ. They show their differences when they take part in activities. Francis W. Parker claimed that people learn to do by doing, learn to hear through hearing, and learn to think through thinking. According to Parker, children should have the ability to compare, contrast, reflect on, and make generalisations (Parker, 1883; cited in Zarrillo, 2016, p. 6). Focusing on practical real-life experiences helps students increase their academic success, establish stronger ties with their society and the environment they live in, understand the value of nature, and grow up as active citizens (Sobel, 2004; cited in Açıkalın, 2018, p. 129).

As seen, in contemporary approaches, students are expected to question, the teachers should guide, and the school should be a place where life continues. Although there are many approaches used in contemporary approaches, authentic learning is regarded as an approach that can effectively provide the transformation in teaching required by the age with its flexible structure offered to teachers in practice. Authentic learning focuses on the real world, complex problems, and solutions using role-playing exercises, problem-based activities, case studies, and participation in virtual practice communities (Lombardi, 2007, p. 2). Individuals are faced with unusual situations every day that they have to solve, adapt, and make decisions in their professional and personal lives. Individuals try to cope with these problems by using and manipulating the knowledge they have acquired and using their experiences and skills. Authentic learning aims to equip students with these basic life skills, show the link between learning and real life, and provide students with problem-solving skills that are necessary beyond school (Pearce, 2016, p. 2). According to Renzulli (1997, p. 3), when content and processes are learned in authentic contexts, more meaningful results are obtained than learning in highly structured and regulated classroom situations using knowledge and problem-solving skills. When learners participating in authentic learning experiences are offered some choices in the areas and activities in which they are involved, and the current experience is directed towards realistic, personalised goals, this type of learning creates interest and meaning. According to Dewey, basic thinking includes the problems faced by the individual and solved following the scientific method. Students must work on everyday social, economic, and political problems that strain them for real learning. There should be discussions in the classrooms about war, peace, poverty, epidemic, and pollution. Similarly, students should be taught how to catch and solve problems outside the school, and this teaching should continue until they become adults and have the right to vote (Gutek, 1997, pp. 103-104). Social studies courses teach students these skills.

Social studies course has a curriculum that can be easily associated with the real world in its content. However, until the end of the 19th century, with the effect of the tradition of "citizenship transfer", social studies was considered as a course in which students memorised information such as the history of events, place names, and articles of international treaties were considered successful (Maxim, 2010; cited in Açıkalın, 2018, p. 155). This tradition has been effective in the long term in social studies education in Turkey. However, due to the effect of the constructivist approach, the social studies curriculum was also updated in 2004. After the new curriculum was launched in 2004, and with the revisions made in the following years, practitioners were asked to give importance to the traditions of "social studies as social sciences" and "social studies as reflective thinking" while the tradition of "social studies as citizenship transfer" was not included in the curriculum. Therefore, in the new curriculum, students are advised to perceive the scientific methods used by social scientists (geographers, historians, etc.) to make use of events inside and outside school to compare them with real-life problems and contradictory situations and to reflect on these social problems (MoNE, 2018b). With these changes, the course aims to train a human model with the qualities required by the age. However, research shows that the methods and techniques that evoke "transfer of citizenship" continue to be used in the classes. Studies revealed that teachers frequently use direct instruction and question-answer methods/techniques in the teaching of social studies course (Çelikkaya et al., 2009; Okur-Akçay et al., 2016; Fırat-Durdukoca, 2018; Karasu-Avcı et al., 2019), which shows that in the courses, the methods and techniques appropriate for the tradition of citizenship transfer are dominant in social studies teaching.

When the course is completely disconnected from the real world and only focuses on exams, it becomes clear that teacher-centred applications are used. Therefore, knowledge is transmitted to students by the teacher, and learning occurs when students memorise the information and give the desired answers in the exams. In this understanding, teaching activities are regarded as acquiring knowledge, skills, and experience. However, learning cannot occur in such a learning environment because the skill and experience dimensions are lacking. On the contrary, associating the subject with current events ensures that the subject is learned in depth. Students can concretise knowledge and concepts by seeing the real-life equivalent of the content of the social studies course. In addition, current events make it easier for students to perceive the world and enable them to lead a qualified life by affecting their lives (Şimşek, 2017, p. 155). Students who can find a solution to a problem in their environment gain the real-life skills required to solve possible problems they will encounter in the future. While the students are busy with the solution of the problem, they find the opportunity to use many skills such as researching, searching for sources, discovering, using information, communication, cooperation, taking responsibility, asking questions, discussing, and making observations (Tokcan, 2015, p. 29).

On this issue, Bruner stated that the best way for students to learn problem-solving is to do the same type of activities themselves as adult practitioners. If children learn history, they should examine primary sources, such as diaries and old newspapers, just like historians (cited in Zarrillo, 2016, p. 7). Therefore, social studies courses should provide many opportunities for children to solve problems and answer complex questions. In the social studies course, students can play out current or historical events. They can imitate real processes, such as the debate committee, and demonstrate their knowledge, skills, and tendencies. As a result, students will have the opportunity to apply skills they can use in real life (Kottler et al., 2013, p.119-120). Based on this information presented in the literature, it is seen that authentic learning, which is an instructional design that stimulates and enables students to explore, is one of the effective approaches that can be used in the courses, especially in the social studies course. Many studies have determined the positive effects of the authentic learning approach on increasing course success, attitude development, and skill acquisition. In the studies conducted for the social studies course, the effects of authentic learning approach on academic achievement, attitude and permanent learning in learning areas at different grade levels were revealed (Baştürk, 2019; Gürgil, 2018; İneç, 2017; Önger, 2019).

Although the new curriculum is based on contemporary approaches and educational understanding, it is seen that the effects of traditional education approaches have not been eliminated yet in Turkey. This situation is also reflected in the 2023 Education Vision Document prepared by the Ministry of National Education (MoNE). In the document, it is stated that; "we have witnessed in recent years that the function of education, which only serves to pass exams and find a job, is prioritised. Therefore, the only indicator of success in education cannot be lecture notes, exam results, intelligence tests and the salaries of professions acquired after

graduation." In the 2023 Education Vision Document, the expressions and goals that point to change and transformation, such as establishing design-skill workshops for schools, adopting process and result-oriented integrated assessment and evaluation approach, considering practice and experience as the main axis, and supporting students to gain the motivation to seek solutions to social problems show that the ongoing practices of traditional approach create problems (MoNE, 2018a, pp. 15-16). Therefore, students, teachers, and school roles in educational activities should be redetermined to eliminate this problematic situation.

On the other hand, in Turkey, the success of education and training activities is mostly evaluated by students' academic success in the entrance exam. However, nowadays, to the end of the first quarter of the 21st century, it is seen that the traditional structure based on the transmission of knowledge continue to exist in schools in Turkey. The results of the PISA exams, which are one of the most important indicators in measuring the skills and acquisitions specific to this century, and the goals set in the 2023 Education Vision Document confirm this situation. Although the average scores of Turkey in the PISA 2018 exam were higher than the previous exam, the results were very far from the desired level. Turkey ranked 42nd in Math, 40th in reading skills, and 39th in science, among 79 countries participating in the 2018 PISA. Moreover, among 37 OECD countries, Turkey ranks 31st in reading skills, 33rd in mathematics, and 30th in science (MoNE, 2019, p. 10). These results indicate that in Turkey, the success rate of the students is not at the desired level.

In summary, in the 21st century, it is not possible to carry out education and training activities with a structure that prioritises the transfer of knowledge of the past to students, sees the teacher as the only authority, and makes students passive and disconnected from the environment and society. Although in the updated social studies curriculum in Turkey there are expressions about bringing real-life topics to the classroom and the statement in the curriculum (MoNE, 2018b, p. 10), it is seen that the activities based on authentic learning, which is one of the techniques that can be effective in terms of social studies course, are limited. In this respect, the social studies course cannot train students expected by today's educational approach. Based on this, this study is based on the assumption that the authentic learning approach will significantly contribute to students' academic achievement and attitude scores in social studies courses. In addition, students are expected to gain the necessary skills to solve real-world problems. Therefore, this study is important in offering teachers an alternative learning process that they can use in their courses. From this view, this study aims to determine the effects of teaching social studies course following the authentic learning approach on students' academic achievement and attitudes towards the course. For this purpose, the study's problem statement was determined as; "What are the effects of teaching social studies courses following the authentic learning approach on students' academic achievement, retention of information, and attitudes towards the course"? The following sub-problems were tried to be answered:

- Is there a statistically significant difference between the students' academic achievements in the experimental and control groups?
- Is there a statistically significant difference between the students' academic achievement test scores (pre-test, post-test, retention test) of the experimental group?
- Is there a statistically significant difference between the students' academic achievement test scores (pre-test, post-test, retention test) in the control group?
- Is there a statistically significant difference between the students' attitudes in the experimental and control groups?
- Is there a statistically significant difference between the attitude scale scores (pre-test, post-test) of the students in the experimental group?
- Is there a statistically significant difference between the attitude scale scores (pre-test, post-test) of students in the control group?
- The study is limited to;
- The 2018-2019 academic year
- The learning outcomes of the "Production, Distribution, and Consumption" learning field covered in 6th grades
- 50 6th grade students studying in two different classes of a secondary school located in the central district of Kütahya Province, in Turkey

- The learning approaches used in the experimental and control groups during the research
- The data obtained from the "Social Studies Course Academic Achievement Test (SSCAAT)" and "Social Studies Course Attitude Scale (SSCAS)"

2. Method

2.1. Research Model

This study is the quantitative part of the research conducted with the mixed method. A quasi-experimental pretest-posttest design with a non-equivalent control group was used in the quantitative part of the research. This design gives importance to the similarity of the participants as much as possible. The control and the experimental group are assigned randomly (Karasar, 2016, p. 137). The pre-test is applied to both groups at the same time. Then while the experimental process is applied to the experimental group, the normal procedure is applied to the control group. After the experimental process, the same test is given to both groups simultaneously as the final test. Pre-test and post-test differences of each group are obtained. The average and standard deviation of the scores are taken. Finally, it is checked whether there is a significant difference between the means of the two achievement tests (Büyüköztürk et al., 2010; Sönmez et al., 2017).

In this study, two groups at the same grade level were formed. One group was assigned as the experimental group, and the other as the control group by random assignment. After the pre-tests (Social Studies Course Academic Achievement Test-SSCAAT and Social Sciences Course Attitude Scale-SSCAS) were applied to both groups, the experimental process took eight weeks. In the experimental group, the social studies course was taught according to the authentic learning approach. On the other hand, in the control group, the current social studies course curriculum and the instructions given in the textbook were followed. After the experimental process was completed, the same tests were applied to both groups as a post-test. In addition to the model, SSCAAT was applied as a retention test to determine the retention levels five weeks after the post-test application. The data obtained at the end of the process were compared and interpreted. The symbolic representation of the quasi-experimental design is shown in Table 1.

Table 1. *Representation of the Quasi-Experimental Design*

Group	Pre-Test	Procedure	Post-Test	Retention Test
G_1	$M_{1,1}$	X	$M_{1,2}$	$M_{1,3}$
G_2	$M_{2,1}$		$M_{2,2}$	$M_{2,3}$

G_1: Experimental Group G_2: Control Group   M: Measurement   X: Experimental Process (Based on authentic learning approach)

2.2. Research Sample

The study group of the research consisted of two 6th grade classes of a secondary school located in the central district of Kütahya Province, Turkey. The same teacher taught the social studies course of these classes. One class was assigned as the experimental group and the other as the control group. There were 28 students in the experimental group and 22 students in the control group. The balancing process was carried out so that the experiment and control groups consisted of students with similar characteristics. In this process, students; 5th-grade year-end achievement scores, grade levels, socioeconomic levels, and being taught by the same teacher were taken into account.

2.3. Data Collection Tools and Procedure

2.3.1. Social Studies Course Academic Achievement Test: The Social Studies Course Academic Achievement Test (SSCAAT), which was prepared to measure students' academic success, was prepared by the researchers as a multiple-choice test. The average difficulty of SSCAAT consisting of 25 questions was calculated as 0.51. This value is close to 0.50, indicating that SSCAAT is at the average difficulty level (Atılgan, 2009, p. 333). The reliability of the test was calculated using the Kuder Richardson (KR-20) method, and the reliability coefficient was found to be .92. A KR-20 value above 0.70 indicates that the test is reliable (Metin, 2015).

2.3.2. Social Studies Course Attitude Scale: The "Social Studies Course Attitude Scale (SSCAS) developed by Gömleksiz and Kan (2013) in a five-point Likert-type was used to determine students' attitudes towards social studies course. The scale consists of 29 items. 14 of the items measure positive attitudes, and 15 measure

negative attitudes. The Cronbach Alpha value calculated for the scale's reliability was found as .61 in the original study.

2.3.3. Procedure: The study was carried out during the spring terms of the 2018-2019 academic year. The process lasted eight weeks. In the study, the students in the experimental group were taught according to authentic learning application steps suggested by Mims (2003). On the other hand, the students in the control group were taught following instructions in the social studies textbook, which was prepared based on the 2018 social studies course curriculum. Textbooks are distributed free of charge by the state in Turkey. These textbooks are the main resource to be used in the classes for students. The Ministry of National Education prohibits using other resources as a primary resource by teachers during the course. For this reason, teachers mostly teach their lessons in line with the instructions in these textbooks. The procedures applied to experimental and control groups are presented in Table 2 below.

Table 2. *Experimental Process*

| PROCESS | PROCEDURES | |
	Experimental Group (Authentic learning approach)	Control group (Social Science Curriculum)
Before Application	Application of Pre-Tests	
Application — Week 1	• Establishing the theoretical infrastructure of "Our resources." o Our lands, waters, mines, forests, and tourism resources • Forming study groups • Giving scenarios to the groups	• Teaching the topic "Our resources turn into gains." o Our lands, waters, mines, forests, and tourism resources o An analysis of Aşık Veysel's "Black Soil" song o "Production stages of bread" activity
Week 2	• Sharing the information of the groups • Out of school activity o Visit to the Revenue Office	• Addressing the topic of "Let's protect our world." o Renewable energy resources o Non-renewable energy resources • Mining exhibition
Week 3	• Mining exhibition • Unconscious consumption of natural resources • Tax awareness activity • "Pay tax for service." • "Keloğlan's moneybox" • Out of school activity • Trip to Medicinal and Aromatic Plants Research Center • Trip to Solar Power Plant • Trip to Sapling/Flower Sale and Landscape Business	• Addressing the topic of "I have a project." o "I am preparing an investment and development project for Kütahya" activity
Week 4	• Out of school activity • Visit to Zafer Development Agency • Information sharing on Kütahya investment group • Review of group work • Professions activity task distribution • Out of school activity • Trip to Cattle Farm	• Addressing the subject of "To bright tomorrows with our taxes." o Tax slogan writing activity
Week 5	• E-conference with Dr. Umut Yıldız • Review of group work • Out of school activity • Visit to Agriculture and Rural Development Support Institution (TKDK) • Sharing the experiences at TKDK visit • What can be done to save energy at school? • Evaluation of the work done on professions	• Addressing the topic "I choose my profession." o E-conference with Dr. Umut Yıldız o "Professions I'm interested in" activity
Week 6	• Exam week break • Energy-saving project • "Future is in Your Hands! Save Energy for the Future" • Thermal tourism needs research • Out of school activity • Trip to Recycling Factory	• Exam week break o The activity of "Kütahya's mineral sources."
Week 7	• The activity of "Kütahya's mineral sources." • Preparation for professions activity	• Exam week break

Week 8	•Professions activity •"Group therapy" •"Promotion of professions" •Presentation of the "Needs of Kütahya Thermal Tourism" report to the Mayor of Kütahya	• Addressing the topic "Qualified people, strong Turkey." o "Help wanted" activity o Sample entrepreneurship stories
After Application	Application of Post-Tests Application of Retention test for SSCAAT (five weeks later)	

The functioning of the authentic learning process applied in the experimental group according to the plan determined by Mims (2003) is as follows:

Course Framework: The aim is to raise the awareness of 6th-grade students about energy efficiency, energy-saving, tax, career choice, and potential of their area of residence within the social studies course "Production, Distribution and Consumption" learning area. Students are expected to gain research, problem-solving, decision-making, creativity, communication, cooperation, social participation, empathy skills and values such as sensitivity, savings, responsibility, patriotism, and being scientific. These skills and values have been acquired by associating them with an authentic context.

Scenarios: The students were divided into four groups that have a balanced distribution in the classroom. Each group was given a different scenario.

Scenario 1: Industrialisation activities, orientation towards new technologies, improvement of living standards and increasing population in our country cause more energy consumption every year. Efficient use of energy, implementation of savings measures in public, and diversification of energy sources (especially renewable energy sources) are among the goals of our country. Well, how much do we obey austerity measures in our homes and schools? More importantly, what can we do about energy efficiency and saving?

Related learning outcome: SB.6.5.1. - SB.6.5.2.

Scenario 2: According to 2017 data published by TUIK, Kütahya was among the provinces with a high level of migration. The majority of migrants are young people. The main reason for this is that the job opportunities in Kütahya are not sufficient. Kütahya cannot use its resources efficiently and receive external investments. In this context, an advertising campaign will be organised to encourage business people to invest in Kütahya. You will also take an active role in this campaign. Your task is to discover the potential of Kütahya and reveal in which areas it can be invested. In which areas does Kütahya need investment?

Related learning outcome: SB.6.5.3.

Scenario 3: According to research conducted, 84% of employees in Turkey do not like their job. So, how productive can a person be by working in a job they do not like? How do you think professional choices should be made? What are the future professions? Can you help your friends with the promotion of professions and career choices?

Related learning outcome: SB.6.5.5. - SB.6.5.6.

Scenario 4: Services such as health, education, national security, and infrastructure, which are indispensable needs of a society, are provided by the state. Taxes paid to the state are very important to pay these needs. Public awareness needs to be raised on taxes. Can you fulfil this task?

Related learning outcome: SB.6.5.4.

Phase 1 – Engagement and Inquiry: Each group determined a group name compatible with the scenario given to them (Energetic Children, Kütahya Investment, We Are the Future, Tax Volunteers). Group leaders were elected. Each group created a WhatsApp group to keep communication strong outside of school. Later, the group members divided labour among themselves for the work and operations. The students primarily researched various sources to obtain preliminary information about the topics mentioned in the scenario. At this stage, the students discovered the people or institutions from which they could get expert opinions. Then they visited persons/institutions individually or in groups. In addition to their existing knowledge, they learned new information from experts. These studies were shared with other students in the classroom, and discussions were made on them. At the end of this stage, all students learned about the problems in the scenarios. Students have put the outputs of their research in their portfolio files.

Phase 2 - The Learning Process: The students decided what work they would do and what kind of products they would develop to solve the problems specified in their scenarios. At this stage, students were expected to develop various materials and activities such as brochures, posters, slides, short films, skits, banners, boards, sports activities, and class visits to convey their messages to other people and raise awareness. Preparations were made for the materials and activities determined by the joint decision of the group members.

Phase 3 – Communication: Materials developed to solve the problems were distributed, projects started, events were exhibited in front of the audience, and reports were presented. At the end of this stage, the students had the opportunity to share their gains with other people, which they gained during the learning process. They made efforts to solve the problems. The activities and their results were disseminated through various tools (press, social networks, etc.).

The products and activities that emerged at the end of this process are:

- In line with Scenario 1, the "Future is in Your Hands! Save Energy for the Future" project was initiated.
- In line with Scenario 2, the "Needs of Kütahya Thermal Tourism" report was prepared. The report was presented to the Mayor of Kütahya by the students.
- Three different events were organised in line with Scenario 3.
  - An e-conference event was held with Astrophysicist Dr Umut Yıldız and information was received on future space professions.
  - With the skit named "Group therapy", the problems caused by the wrong choice of profession were pointed out. In the skit, displayed in front of students and teachers, the students played doctors, homemakers, and self-employed people who lived an unhappy life due to their profession and applied them to a psychiatric clinic to find a solution.
  - Students introduced the professions to other students at the school with the profession promotion activity. Each of the students wore special clothes and equipment of a profession. In addition, they presented the personality traits of the profession, the skills that should be possessed, and the education process with posters they prepared.
- In line with Scenario 4, they prepared a public service announcement (PSA) with the theme "Pay tax for service" to draw attention to the importance of taxing. They presented the cartoon named "Keloğlan's Moneybox" and public service announcements in different classrooms and raised students' awareness about tax.

Before starting the research, some publications (national and international theses, books, articles, etc.) that constitute the theoretical framework of authentic learning were sent to the course teacher to provide information about the theoretical structure of authentic learning. Additionally, the applications for the experimental process were planned together with constant communication between the researcher and the teacher.

The implementation process was carried out by the course teacher. In this process, volunteering was taken as a basis. The course teacher was informed about the aim, content, and context of the study. During this process, the researcher took place as an observer in all the experimental and control groups' lessons. In the lessons conducted with the experimental group, the researcher studied with the course teacher to carry out the process according to the authentic learning approach. On the other hand, in the lessons conducted with the control group, the researcher presented in the classes, and the researcher observed the entire lesson. However, the researcher did not interfere with the lessons to eliminate the threats that may affect the result of the experimental process, and the course teacher implemented the lessons.

2.4. Data Analysis

The data obtained by SSCAAT and SSCAS were transferred to the computer environment and analysed using a statistical package program. Firstly, to determine the appropriate statistical methods, it was checked whether the data distributed normally or not. The p-value obtained from the Shapiro-Wilks test was examined to test the normal distribution of the data

The Shapiro-Wilks test is recommended to be used in small samples (Abbott, 2017, p. 232; Büyüköztürk, 2008, p. 42; Pole et al., 2010, p. 933). The p-value higher than α=.05 in the analysis indicates that the scores at this significance level are suitable for a normal distribution (Büyüköztürk, 2008, p. 42; Coşkun et al., 2017, p. 174; Pallant, 2017, p. 75; Pole et al., 2010, p. 933; Yazıcıoğlu et al., 2007, p. 192). The analyses conducted on the normality of the SSCAAT and SSCAS scores of the study group are presented in Table 3 below.

Table 3. *Normality Test Results for the SSCAAT and SSCAS Scores of the Students in the Working Group*

Scale	Group	Measurement	N	Shapiro-Wilk	
				Statistic	p-value
SSCAAT	Experimental group	Pre-test	28	.932	.070
		Post-test	28	.936	.087
		Retention test	28	.943	.135
	Control group	Pre-test	22	.943	.228
		Post-test	22	.974	.802
		Retention test	22	.977	.854
SSCAS	Experimental group	Pre-test	28	.961	.366
		Post-test	28	.931	.063
	Control group	Pre-test	22	.939	.193
		Post-test	22	.961	.510

The fact that p values of the Shapiro-Wilk test conducted to determine the normality of the data obtained from the scales pre-test, post-test, and retention test scores were higher than α=.05, shows that the scores do not deviate excessively from the normal distribution and shows a normal distribution.

As a result of the normality test results, it was found that the scores obtained from the SSCAAT, SSCAC, pre-test and post-tests, and the SSCAAT retention test normally distributed in all groups, and therefore parametric tests were used in the analysis of the data.

Effect size shows the strength of the interpretations made about the differences between groups or correlations between variables in quantitative studies (Creswell, 2013, p. 165). In this study, Cohen's d and eta squared (η^2) values were used to determine the effect size of the differences between averages. While interpreting the obtained effect size coefficients, the d value of .20, .50, .80 were considered as a small effect, medium effect, and large effect, respectively (Cohen, 1988, pp. 25-26). While interpreting the eta squared (η^2) effect size, the values of .01, .6, and .14 were taken as small, medium, and large, respectively (Büyüköztürk, 2008, p. 44).

3. Findings

The results of the tests to determine the differences between the mean scores obtained from SSCAAT, which was applied to determine the experimental and control groups academic success levels, the SSCAS, which was applied to determine their attitudes towards the course, are presented below.

3.1. Findings Regarding the Social Studies Course Academic Achievement Test

To determine the differences between the pre-test, post-test, and retention test mean scores of students in the experimental and control groups, paired samples t-test for independent samples, t-test for impaired samples, and a one-way repeated measures ANOVA were conducted. Cohen's d and eta squared (η^2) values were used to determine the effect size of the differences between the mean scores.

3.1.1. Findings on the comparison of independent samples pre-test, post-test, and retention test scores: To compare the students' SSCAAT scores in the experimental and control groups, independent samples t-test was conducted, and the obtained results are presented in Table 4.

Table 4. *Independent Samples t-test Results*

Scores	Variables	n	$\bar{X}$	S	t	sd	p	η^2	Cohen's d
Pre-test	Experimental	28	38.00	5.38	.69	48	.491	.01	.19
	Control	22	39.27	7.57					
Post-test	Experimental	28	67.28	13.55	1.31	48	.196	.03	.37
	Control	22	62.18	13.78					
Retention Test	Experiment	28	70.28	17.29	2.82	48	.007	.14	.80
	Control	22	56.18	17.78					

Comparison of pre-test scores: There is no significant difference between the scores obtained from the experimental group (X=38.00, S=5.38) and the control group (X=39.27, S=7.57; t(48)=.69, p=.491). The difference between the mean scores (mean difference=1.27, 95% confidence interval: between -2.41 and 4.95) is very small (Cohen's d=.19). The obtained η^2 value (.01) also indicates a small effect (Table 4). Accordingly, 1% of the variance of pre-test scores of the experimental and control groups obtained from SSCAAT is explained by the group variable. In addition, these results show that before the experimental procedure, the experimental group and the control group were equivalent to each other in terms of academic achievement in social studies course.

Comparison of post-test scores: According to the results of the test, there was no significant difference between the scores obtained from the experimental group (X=67.28, S=13.55) and the control group (X=62.18, S=13.78; t(48)=1.31, p=.196). The difference between the mean scores (mean difference=5.10, 95% confidence interval; between -12.97 and 2.72) is very small (Cohen's d=.37). Accordingly, 3% of the variance of post-test scores of the experimental group and control group obtained from SSCAAT is explained by the group variable (η^2=.03).

Comparison of retention test scores: It was found that there was a significant difference in favour of the experimental group in terms of the scores obtained from the experimental group (X=70.28, S=17.29) and the control group (X=56.18, S=17.78; t(48)=2.82, p=.007). The difference between the mean scores (mean difference=14.10, 95% confidence interval; between -24.13 and -4.07) is higher (Cohen's d=.80). The obtained value of η^2 (.14) also indicates a large effect (Table 4). Accordingly, 14% of the variance of retention test scores of the experimental group and control group obtained from SSCAAT is explained by the group variable. This finding shows that the authentic learning approach has a greater effect on the retention of information than the social science course implemented according to the instructions given in the textbook.

3.1.2. Findings regarding the comparison of paired samples pre-test, post-test, and retention test scores: To evaluate the effect of the experimental process on the pre-test, post-test, and retention test scores of the students in the study group, the one-way repeated measures ANOVA test was conducted, and the findings are presented in Table 5.

Table 5. *One-Way Repeated Measures ANOVA Results*

Group	Source of Variance	Sum of Squares	sd	Mean of Squares	F	p	Significant Difference*	Partial η^2
Experimental group	Between groups	5550.28	27	205.56	58.14	.000	1-2, 1-3	.86
	Measurement	17817.52	2	8908.76				
	Error	8273.14	54	153.20				
	Total	31640.94	83					
Control group	Between groups	4764.36	21	226.87	18.44	.000	1-2, 1-3	.69
	Measurement	6209.46	2	3104.73				
	Error	7070.55	42	168.35				
	Total	18044,37	65					

* 1= Pre-Test,   2= Post-Test,   3= Retention Test

Comparison scores of experimental group: It was found that there was a statistically significant difference between the SSCAAT pre-test scores, post-test, and retention test scores of the students in the experimental group (Wilks' Lambda=.13, $F_{(2, 26)}$=58.14, p=.000, partial η^2=.86). The obtained partial η^2 (.86) indicates a large effect (Table 5). Post-test mean scores (X=67.28, S=13.55) and retention test mean scores (X=70.28, S=17.29) were found to be higher than the pre-test mean score (X=38.00, S=5.38). On the other hand, the difference between post-test and retention test scores was not significant. This finding indicates that the authentic learning approach used in the course teaching caused a statistically significant increase in the students' academic achievement after the application and the retention test scores. It also showed that the measurement results

obtained after the application and the results of the subsequent follow-up measurement did not differ from each other; that is, the effect of the application on academic achievement continued.

Comparison scores of control group: It was found that there was a statistically significant difference between the SSCAAT pre-test scores and the post-test and retention test scores of the control group students (Wilks' Lambda=.31, $F(2, 20)$=18.44, p=.000, partial η^2=.69). The obtained partial η^2 (.69) indicates a large effect (Table 5). Post-test mean score (X=62.18, S=13.78) and retention test mean score (X=56.18, S=17.78) was found to be higher than the pre-test mean score (X=39.27, S=7.57). On the other hand, the difference between post-test and retention test scores was not statistically significant. This finding indicates that the social science course curriculum implemented according to the instructions given in the textbook caused an increase in students' academic achievement after the application. It also showed that results obtained from the measurement conducted after the process did not differ from the measurement results in the subsequent follow-up measurement. Still, there was a decrease in the mean scores compared to after the application.

3.2. Findings Obtained from Social Studies Course Attitude Scale

To determine the differences between the pre-test and post-test mean scores obtained from SSCAS, which was applied to determine the students' attitudes in the experimental and control groups towards the social studies course, paired samples t-test and independent samples t-test were carried out. Cohen's d and eta squared (η^2) values were used to determine the effect size of the differences between the mean scores.

3.2.1. Findings regarding the comparison of independent samples pre-test and post-test scores:
Independent samples t-test was conducted to compare the students' SSCAS pre-test and post-test scores in the experimental group and the control group. The obtained findings are presented in Table 6.

Table 6. *Independent Samples t-test Result*

Scores	Variable	n	X̄	S	t	sd	p	η^2	Cohen's d
Pre-test	Experimental	28	106.21	13.39	.68	48	.499	.01	.19
	Control	22	108.86	13.95					
Post-test	Experimental	28	118.17	10.43	2.60	47.93	.012	.12	.72
	Control	22	111.45	7.84					

Comparison of pre-test scores: As seen in Table 6, there was no significant difference between the scores obtained from the experimental group (X=106.21, S=13.39) and the control group (X=108.86, S=13.95; t(48)=.68, p=.499). The difference between the mean scores (mean difference=2.65, 95% confidence interval: between -10.46 and 5.16) is very small (Cohen's d=.19). The obtained η^2 value (.01) also indicates a small effect (Table 6). Accordingly, 1% of the variance of pre-test scores of the experimental and control groups obtained from SSCAS is explained by the group variable. In addition, these results show that the experimental group and the control group were equal to each other in terms of attitudes towards the social studies course before the experimental procedure.

Comparison of post-test scores: A statistically significant difference was obtained in the SSCAS scores of the students in the experimental group (X=118.17, S=10.43) and the control group (X=111.45, S=7.84); t(47.93)=2.60, p=.012. The mean difference in SSCAS scores was 6.72, and the values have a 95% confidence interval ranging from -11.92 to -1.53. Cohen's d value (.72) indicates a medium effect size. The obtained η^2 statistic (.12) also indicates a medium effect size (Table 6). This value shows that the group variable explains 12% of the variance of post-test scores of the students in the experimental group and the control group obtained from SSCAS. This finding shows that the use of authentic learning approach practices in social studies lesson is more effective than the process based on the instructions given in the textbook in developing positive attitudes towards the course.

3.2.2. Findings regarding the comparison of paired samples pre-test and post-test scores:
Paired samples t-test was conducted to determine the effect of the experimental process on the study group students' SSCAS scores. Analysis results are given in Table 7.

Table 7. *Paired Samples t-test Results*

Scores	Variable	n	$\bar{X}$	S	t	sd	p	η²	Cohen's d
Experimental group	Pre-test	28	106.21	13.39	3.60	27	.001	.32	.68
	Post-test	28	118.17	10.43					
Control group	Pre-test	22	108.86	13.95	.83	21	.417	.03	.18
	Post-test	22	111.45	7.84					

Comparison scores of experimental group: When the pre-test (X=106.21, S=13.39) and post-test (X=118.17, S=10.43) scores of the students obtained from SSCAS were examined, it was seen that there was a statistically significant increase, t (27)=3.60, p=.001 (two-way). The increase in the SSCAS scores was 11.96, and the values have a 95% confidence interval ranging from -18.78 to -5.14. Cohen's d value (.68) indicates a medium effect size. The obtained η² statistic (.32) indicates a large effect size (Table 7). This value shows that 32% of the variance of post-test scores of the experimental group obtained from SSCAS is explained by the approach applied in the teaching. Therefore, it can be interpreted that authentic learning approach practices in social studies course greatly affect developing students' attitudes towards social studies course.

Comparison scores of control group: There was no significant difference between the scores obtained from the pre-test (X=108.86, S=13.95) and the post-test (X=111.45, S=7.84; t (21)=.83, p=.417). The difference between the mean scores (mean difference=2.59, 95% confidence interval; ranging from -9.09 to 3.91) is very small (Cohen's d=.18). The obtained η² value (.03) also indicates a small effect (Table 7). Accordingly, 3% of the variance of post-test scores of the control group obtained from SSCAS is explained by approaches used while teaching. The result shows that using a curriculum-based learning approach in social studies course does not cause any significant change in students' attitudes towards the course.

4. Conclusion and Discussion

The effect of authentic learning approaches on the academic achievement and the attitude towards the course was investigated in terms of social studies course, and the following results were obtained;

As a result of the experimental process, it was found that the academic achievement levels of the students in the experimental group and the control group increased and significantly differed when compared to the pre-experimental process. While the difference between the post-test scores of the two groups was not statistically significant, a significant difference was found in the retention test scores in favour of the experimental group. This result shows that the authentic learning approach has a greater effect on the retention of information.

When the literature is examined, it is seen that there are some similar results in many studies investigating the effect of the authentic learning approach on the academic achievement of students at various educational levels. The conducted studies showed that using a geo-media supported authentic learning approach in social studies course (İneç, 2017) and using authentic learning activities (Gürgil, 2018); including technology-supported authentic learning activities (Karabulut, 2018) and authentic learning practices in the science course (Aynas, 2018); including authentic task-oriented practices in foreign language education (Karakoç, 2016); the use of authentic learning environments in mathematics lessons (Aydın, 2019) has yielded more effective results than traditional approaches in increasing students' academic achievement and retention of knowledge.

The studies conducted with undergraduate students, including authentic task-oriented practices in programming teaching (Pullu, 2019) and implementing the curriculum prepared following an authentic task-oriented constructivist approach (Koçyiğit, 2011), have been more effective for students' academic success than implementing the current curriculum. Authentic chemistry problem-solving competency module developed for chemistry teaching (Muhamad et al., 2017), digital thinking authentic learning environment developed for computer literacy course (Mingo, 2013), and teaching mathematics lessons with authentic methods (Blum, 2002) have shown the effectiveness of using these approaches in teaching. There are also studies concluding that authentic learning does not increase academic achievement at the desired level. Maddox (2012) expressed that authentic pedagogy on student performance in graduation exams was small but positive. Gulikers et al. (2005) found that students in authentic learning environments do not perform better than students in non-authentic learning environments, contrary to expectations. The conducted studies show that an authentic learning approach is an approach that can be applied in all education levels and many

disciplines. When compared to teaching methods based on knowledge transfer, authentic learning is a teaching approach in which the students construct the information by reaching it themselves and discovering the contexts in which they will use it. In addition, in the classes where the authentic learning approach is used, students reinforce their learning by collaborating and assuming various roles and tasks in outdoor activities.

As a result of the experimental process, the changes in the students' attitudes in the control group towards the social studies course were not found to be significant compared to the pre-experimental process, while the changes in the attitudes of the students in the experimental group were found significant. These results show that using an authentic learning approach in social studies course positively changes students' attitudes towards the course.

Furthermore, while there was no significant difference between the pre-test attitude scores of the students in the experimental and control groups, a significant difference was found between the post-test attitude scores favouring the experimental group. The positive effect of the authentic learning approach on students' attitudes towards the course has also been determined in different studies. In these studies, positive changes were obtained in students' attitudes towards the course in social studies (İneç, 2017; Baştürk, 2019), life studies (Gündoğan, 2017), Turkish (Hamurcu, 2016; Güner, 2016), mathematics (Aydın, 2019), and science (Karabulut, 2018; Aynas, 2018) courses which were based on authentic learning approach in primary and secondary school levels. The use of an authentic learning approach in the visual arts (Dilmaç & Dilmaç, 2014) and mathematics (Blum, 2002) courses at secondary education levels; the use of an authentic learning approach in programming teaching (Pullu, 2019), community service practices (Horzum & Bektaş, 2012), and special teaching methods (Koçyiğit, 2011) at higher education level contributed to students' positive attitudes towards the course. Students must have a positive attitude towards the course to increase their motivation and bring success with it. Students' enjoyment of the course, finding the lesson enjoyable, and their willingness to participate in the lesson will make them active in the classroom and classroom interaction will develop positively. As in this study, most of the studies indicated that students' academic achievement increased. Students gained permanent knowledge and developed positive attitudes towards the course conducted according to the authentic learning approach. In this respect, the authentic learning approach constitutes an important alternative to the methods based on knowledge transfer, which teachers still use intensively. The student is in the position of passive information receptors.

5. Recommendations

In line with the results obtained from this study, the following recommendations are presented;

- In line with the authentic learning approach, social studies and other courses should include more activities involving daily life problems. Students should be faced with real-world problems and should be asked to offer solutions to these problems. Thus, students will have the opportunity to discover which area of daily life they can use the learning outcomes they achieve in knowledge, skills, and values.
- The authentic learning process is a process that needs to be planned well. If it is not planned well, the desired results will not be obtained, and it may cause a significant loss of time. For this reason, teachers should discuss and decide at the beginning of the year which learning outcomes will be processed with methods appropriate for authentic learning, what kind of activities will be planned and how much time will be allocated.
- Complex problems with more than one solution should be preferred instead of problems with a single solution in the authentic learning process. Solutions should not be presented as ready-made; students should be asked to find their own solutions. Different ideas and solutions should emerge in the process, and students should find the best solution with a common decision.
- Field trips play an important role in establishing the link between the school and the real world. Due to the field trips held in this study, the students could get information from experts and experience the work. In addition, the trips have been effective in ensuring the permanence of the knowledge and developing the students' positive attitude towards the course. Trips should be considered an integral part of education and training activities, and they should be arranged in the relevant fields by considering the courses' learning.

- Authentic learning is a teaching process that is not limited to classroom activities and includes classroom and even out-of-school activities. Therefore, it is important to get the support of the stakeholders in the implementation of the process. The school management should cooperate with teachers and parents, and their support should be obtained in the necessary areas, starting from the planning process of the activities. Therefore, the possible problems will be minimised, and the activities will have a wider effect with the multiplier effect.
- The products and the tasks produced by students in the authentic learning process should be exhibited and disseminated using various communication tools. For this purpose, panels in classrooms and corridors can be used to display products. In addition, official websites of schools, social media accounts, and media outlets broadcasting at a local or national level can contribute to disseminating these activities.
- Since authentic learning is an activity-based approach, students and parents may be anxious about gaining the academic knowledge required for central exams. However, in this study and other studies investigating the effects of authentic learning, it has been concluded that there is no difference in terms of students' academic success rate in authentic learning environments and students who learn in non-authentic environments. The teacher should follow the students' academic progress and support them with supplementary extracurricular activities to minimise these concerns.
- This study was carried out in terms of social studies course and secondary school grade. Similar studies can be conducted in different courses and at different grades. Therefore, comparisons can be conducted between the grade levels.

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Literary Curiosity Scale for Secondary Education Students: A Scale Development Study

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ARTICLE INFO	ABSTRACT
	This study is an attitude scale development study that reveals high school students (9th, 10th, 11th grades) literary curiosity. It is thought that students with high literary curiosity have a reading culture. Reading culture is a reading level reached by transforming reading into a habit and critical reading skill. The scale created for this purpose is a 5-point Likert-type scale consisting of 30 items. The scales pilot study was conducted on 522 high school students in the fall semester of the 2018-2019 academic year. Exploratory factor analysis was performed to assess the construct validity of the scale. A relationship was found between the variables in the factor analysis of the items (KMO=0.955>0.60). This size was sufficient for factor analysis. As a result of the factor analysis, the variables were gathered under four factors with a total explained variance of 52.664%. The Cronbach's Alpha (α) internal consistency coefficient for the scale items was found to be 0.945. According to the scale and test-retest findings, the scale scores differed in the bottom 27% and top 27% groups. Therefore, the literary curiosity scale was found out to be a valid and reliable instrument considering the alpha for reliability, the explained variance value, and the factor loads.

1. Introduction

Learning begins with curiosity. Recognising student's curiosity and carrying out education processes and constructing education systems accordingly is a global necessity. To guide students, knowing their levels of knowledge and curiosity are important. Curious students ask questions and seek answers; they feel the need to search and investigate. Although curiosity does not result in a certain way of behaviour, it leads to learning and raises student's awareness.

The relationship between the concept of attitude and the concept of curiosity is important in terms of success. Besides showing the individuals' feelings for or against various groups, ideas, or objects, attitudes also show their tendencies to accept or reject them (Gay & Airasian, 2000). The student who desires to know, wonders, searches, and starts to learn through the process. Kilmer and Hofman (1995) consider the concept of science as wondering about the world, problem-solving, and the process of understanding how the world works. Hence, it can be suggested that attitudes are one of the significant issues in gaining habits. When education is considered the process of providing individuals with upper-level thinking skills and effective features such as interest, attitude, values, and fundamental knowledge, it can be asserted that literature is an important and concrete tool in fulfilling these purposes of education (Karakuş, 2005). In line with the general objectives of the

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Turkish National Education and national and sentimental values, upper level thinking skills can also be provided at schools through literary texts (Arslan & Şimşek, 2018, p. 111).

Accordingly, in her study, Kuzu (2013, p. 67) suggests that teachers should show the books they are reading to their students, give brief information about the books they benefit from, and make recommendations. Furthermore, Kuzu (2013,p. 67) has indicated that students' reading attitudes will be improved if administrators and teachers can be inspiring by quoting such works and be a model for students when they address them in class, meetings, or other occasions.

The age we live in can be defined as the information age, and it is an inevitable fact that it is easier to access information. Taşkesenlioğlu (2013, p. 2) points out that this situation does not devalue reading; on the contrary, it sets the ground for considering it not merely as a way to obtain information. Taşkesenlioğlu (ibid.) also emphasises that individuals should gain the habit of reading which is the basis for education to keep up with the pace of the age and have an important position in society. Reading shapes individuals' behaviours and relationships with others; enriches their inner worlds; widens their point of view; makes them look around in an unprejudiced way; makes them free to think and create and gain the habit of evaluation; develops their language skills; and increases their level of taste (Koç & Müftüoğlu, 2008, p. 62).

In his study on secondary education students' reading habits, Taşkesenlioğlu (2013, p. 3) has found that a considerable part of the students has a low reading culture (reading culture is highly related to the education levels of the parents of the student); they mostly read for their courses; and that the reading rate is lower for the 10th and 11th-grade students compared to the 9th-grade students who have just started high school and the 12th-grade students who are about to graduate. This study, which was conducted in 2013, has shown that student's background is not enough to reach the literary curiosity level.

In their study, Uzun and Hüküm (2014, p. 78) state that in today's world, literature is not exactly the subject matter of any discipline, and it is a field of art that is involved in different disciplines, which involves a great deal of information. Additionally, Uzun and Hüküm (ibid.) indicates that literature is a field of art accompanying individuals' problem of existence on earth. Humans' process of making sense of themselves and the world does not have a structure that progresses merely through science. In this respect, it should also be added that literature is a field of the education of emotions.

The fundamental driving force behind the formation of reading culture is literary works; therefore, it is important to reveal students' perceptions towards literary works. However, the publications considered as course books do not have a purpose of developing the consciousness of existing with aesthetic pleasure or developing language consciousness in people (Uzun & Hüküm, 2014, p. 80). Furthermore, it should be remembered that such publications within the scope of literary works are read as a consequence of necessity rather than choice aiming at pleasure and gaining the habit of reading.

Additionally, in their study concerning the adaptation and orientation processes of 9th-grade high school students, Çeçen and Deniz (2015, p. 204) have also demonstrated that teachers and friends negatively impact their academic achievements and attitudes towards reading. They have concluded that the 10th-grade students' attitudes towards reading are low as they are still under the influence of adolescence and their education fields are not certain. Furthermore, it has been observed that students with the highest reading attitude are the 11th-grade students. Students who have overcome the negative effects of adolescence; determined their education fields; got used to their schools, teachers, and friends do not have university exam anxiety. It is evident that exam anxiety and psychological changes depending on age negatively impact reading habit and reading culture, which constitutes the ground for literary curiosity.

Upon reviewing the related literature, Arslan and Şimşek (2018)'s study concerning the development of the scale for secondary education students' attitudes towards the Turkish language and literature was the closest study to the present study. This scale consisted of 28 items and was conducted on 171 students. Therefore, it was thought that it would be helpful to first identify students' attitudes towards the course at the beginning of the Turkish language and literature education in secondary education institutions. In this way, the students with negative attitudes would be identified, and they would be provided with information, skills, and values necessary for a positive change in a planned way. Moreover, such a study can also support higher-level outcomes within a shorter time frame (Arslan & Şimşek, 2018, p. 111).

Similarly, Can (2016) conducted a 22-item attitude scale development study concerning secondary education students' participation in Turkish language and literature. The purpose of this study was to develop a scale to reveal the attitudes of secondary education students (9th, 10th, and 11th grades) towards their curiosity and interest in literature (literary world).

Consequently, from the studies reviewed above, there was a necessity to develop a scale concerning the topic. For this purpose, a study has been carried out to develop a literary curiosity scale for secondary education students. Even though the pilot study was conducted in three different high schools in the 2018-2019 academic year, the scale can also be applied to secondary school and university students. Additionally, Turkish language and literature teachers can also use the scale to measure students' attitudes towards the course, and academics could use it in scientific studies.

As a result of the literature review, no studies have been found concerning curiosity in literature or literary curiosity. Therefore, identifying students' literary curiosity levels will particularly guide in preparing the course content for Turkish language and literature courses and other general courses.

2. Method

This study is an attitude scale development study carried out to reveal high school students' literary curiosity. The preliminary survey for the exploratory factor analysis of the scale was conducted on 522 students studying in 9th, 10th, and 11th grades in three different secondary education institutions in Istanbul during the fall semester of the 2018-2019 academic year. Comrey and Lee (1992) emphasised that a sample consisting of 500 people is "very good" for factor analysis.

Table 1. *Exploratory Factor Analysis Study Group*

Groups	Frequency (n)	Percentage (%)
Gender		
Female	187	35.8
Male	335	64.2
Class	*Class*	
9	222	42.5
10	138	26.4
11	162	31.0
Socio-economic Level		
Very low	7	1.3
Low	34	6.5
Middle	402	77.0
High	70	13.4
Very high	9	1.7
Mothers Education Level		
Primary school and below	183	35.1
Secondary school	210	40.2
High school	118	22.6
Associate degree	4	0.8
Undergraduate degree and above	7	1.3
Fathers Education Level		
Primary school and below	129	24.7
Secondary school	229	43.9
High school	139	26.6
Associate degree	10	1.9
Undergraduate degree and above	15	2.9

When the students are examined, the distribution is as follows: in terms of gender, 187 (35.8%) are female, 335 (64.2%) are male; in terms of class level, 222 (42.5%) are 9th, 138 (26.4%) are 10th, 162 (31.0%) are 11th grade; in terms of socioeconomic levels, 7 (1.3%) have very low, 34 (6.5%) have low, 402 (77.0%) have middle, 70 (13.4%) have high, and 9 (1.7%) have a very high socioeconomic level.

When the students' mothers' levels of education are examined, 183 (35.1%) are primary school (or below) graduates, 210 (40.2%) are secondary school graduates, 118 (22.6%) are high school graduates, 4 (0.8%) have

an associate degree, and 7 (1.3%) have an undergraduate degree or above. The distribution in terms of father education level is as follows: 129 (24.7%) are primary school (or below) graduates, 229 (43.9%) are secondary school graduates, 139 (26.6%) are high school graduates, 10 (1.9%) have an associate degree, and 15 (2.9%) have an undergraduate degree or above.

The preliminary survey for the confirmatory factor analysis of the scale was conducted on 465 students studying in 9th, 10th, and 11th grades in three different secondary education institutions in Istanbul during the fall semester of the 2019-2020 academic year.

Table 2. *Confirmatory Factor Analysis Study Group*

Groups	Frequency (n)	Percentage (%)
Gender		
Female	170	36.6
Male	295	63.4
Class		
9	191	41.1
10	112	24.1
11	162	34.8
Socio-economic Level		
Low	37	8.0
Middle	362	77.8
High	66	14.2
Mothers Education Level		
Primary school and below	165	35.5
Secondary school	185	39.8
High school and above	115	24.7
Fathers Education Level		
Primary school and below	116	24.9
Secondary school	203	43.7
High school and above	146	31.4

When the students are examined, the distribution is as follows: in terms of gender, 170 (36.6%) are female, 295 (63.4%) are male; in terms of class level, 191 (41.1%) are 9th, 112 (24.1%) are 10th, 162 (34.8%) are 11th grade; in terms of socioeconomic levels, 37 (8.0%) have low, 362 (77.8%) have middle, and 66 (14.2%) have a high socioeconomic level.

When the students' mothers' levels of education are examined, 165 (35.5%) are primary school (or below) graduates, 185 (39.8%) are secondary school graduates, 115 (24.7%) are high school or above graduates. On the other hand, the distribution in terms of the fathers' education level is as follows: 116 (24.9%) are primary school (or below) graduates, 203 (43.7%) are secondary school graduates, and 146 (31.4%) are high school or above graduates.

The items used in the scale were analysed in terms of content and clarity by three Turkish language and literature teachers and two experts of curriculum and instruction, and revisions were made. Each statement in the scale was designed on a 5-point Likert-type scale, including the options "never", "rarely", "sometimes", "often", and "always".

2.1. Statistical Analysis of the Data

The data obtained in the research were analysed by using SPSS (Statistical Package for Social Sciences) for Windows 22.0 and AMOS software. Kurtosis and skewness analysis was performed to determine the normal distribution of the scale items.

In the related literature, the results concerning the kurtosis and skewness values of variables are considered normal distribution when they are between +1.5 and -1.5 (Tabachnik & Fidell, 2013) and +2.0 and -2.0 (George & Mallery, 2010).

Table 3. *Normal Distribution*

	Kurtosis	Skewness
M1	-.891	.401
M2	-.491	.301
M3	.142	.989
M4	-.317	.706
M5	-.828	.205
M6	-.934	-.012
M7	-.784	.053
M8	-1.103	.053
M9	-.586	.591
M10	-.423	.543
M11	-.275	.682
M12	-.635	.477
M13	-.657	.416
M14	-.603	.592
M15	-.116	.926
M16	-1.095	.188
M17	-.358	.659
M18	-.560	.574
M19	-1.134	.244
M20	-.648	.599
M21	-.529	.748
M22	-1.041	.315
M23	-1.292	.181
M24	-1.114	.144
M25	-.781	.383
M26	-.406	.643
M27	-.159	.891
M28	-1.081	.267
M29	-1.172	.101
M30	-1.147	.316

In evaluating the data, reliability analysis, item analysis, exploratory factor analysis, confirmatory factor analysis, independent sample t-test, and dependent group t-test were used.

3. Findings

In this part, the data analysis findings gathered from the participating student's scales are presented to solve the research problem. Explanations and comments were made based on the findings.

3.1. Reliability Analysis

Reliability analysis was applied in the study to determine the internal consistency of the literary curiosity scale. Reliability analysis shows whether the scale items are consistent with each other and the overall scale. At the same time, it determines whether the participants understood the items in the scale the same way. Thus, reliability is the consistency among the responses the participants give for the items in the scale (Büyüköztürk, 2011, p. 169). Cronbach's Alpha coefficient commonly determines the reliability of the scale (internal consistency) in the literature. The evaluation criteria in the evaluation of Cronbach's Alpha coefficient are as follows: "If $0.00 \leq \alpha < 0.40$ then the scale is not reliable", "If $0.40 \leq \alpha < 0.60$ then the scale has low reliability", "If $0.60 \leq \alpha < 0.80$ then the scale is rather reliable", "If $0,80 \leq \alpha < 1,00$ then the scale is highly reliable" (Özdamar, 2004).

Table 4. *Scale Items*

M1 There are authors and poets that I admire.
M2 I am curious about the events or situations that take place in literary works.
M3 I also research an author's or poet's other works that I have not read.
M4 I have an ongoing plan concerning the works I will read.
M5 I think literary works are enjoyable.
M6 I consider myself a good reader.
M7 I consider literary culture among my competencies (desired maturity) and my qualifications (being sufficient).
M8 I select the works I will read among good examples of the genre in terms of language, narration, and content.
M9 I research the lives of literary authors.
M10 I question the place of literary texts in history.
M11 I try to learn about the social, political features that influenced the literary world in the period that the text was written.
M12 An author's literary personality and understanding of art are among the things I should know.
M13 I pay attention to the distinctive features of literary periods.
M14 I know the prominent authors of literary genres.
M15 I try to create literary works.
M16 I like spending time in the library.
M17 I look for the presence of national and universal values in literary texts.
M18 I spend time understanding literary art activities.
M19 I work and try to develop my writing skill.
M20 I follow current books and literary journals.
M21 I try not to miss book fairs and autograph sessions.
M22 The expression of feelings in the works arouses curiosity in me.
M23 I cannot stop reading suspenseful works.
M24 I can easily talk about the books I read in social environments.
M25 I like to analyse literary works and express my opinions about them.
M26 I give examples from literary works while I am talking.
M27 I attend literary interviews and conferences.
M28 I am interested in different figures of speech.
M29 I am careful about punctuation rules while I am trying to write.
M30 While reading a book, I use a dictionary for the words I do not know.

The reliability analysis for the literary curiosity scale was conducted, and the reliability of 30 items was found to be Alpha=0.945. The item analysis concerning the effect of items on the internal consistency is presented below.

Table 5. *Literary Curiosity Scale Item Analysis*

	Scale mean if item deleted	Scale variance if item deleted	Corrected item – total correlation	Cronbach's alpha if item deleted
M1	73.39	503.174	.593	.943
M2	73.42	508.935	.592	.943
M3	74.02	505.708	.612	.943
M4	73.90	508.382	.572	.943
M5	73.27	505.036	.608	.943
M6	73.04	512.459	.461	.944
M7	73.20	510.213	.524	.943
M8	73.20	504.258	.571	.943
M9	73.81	504.810	.632	.942
M10	73.75	506.619	.616	.943
M11	73.84	506.446	.617	.943
M12	73.59	501.535	.680	.942
M13	73.68	505.314	.644	.942
M14	73.78	505.244	.608	.943

M15	74.03	505.803	.605	.943
M16	73.32	504.183	.570	.943
M17	73.86	504.837	.652	.942
M18	73.76	503.234	.661	.942
M19	73.37	503.221	.571	.943
M20	73.79	503.782	.623	.942
M21	73.92	509.928	.507	.944
M22	73.39	500.696	.623	.942
M23	73.25	501.326	.571	.943
M24	73.28	504.879	.549	.943
M25	73.58	502.658	.652	.942
M26	73.85	507.328	.599	.943
M27	74.02	510.798	.507	.944
M28	73.41	505.969	.532	.943
M29	73.19	504.267	.553	.943
M30	73.40	505.273	.520	.944

When the table is analysed, no item is observed to affect the scale's internal consistency negatively. The invariance of the scale scores against time was analysed by conducting a test-retest with 35 people at two weeks interval. It was observed that scale items showed consistency according to the test-retest analysis (p>0.05).

Table 6. *Test-Retest Analysis*

| Measurements | Test | | Retest | | *n* | *t* | *p* |
	Mean	Sd	Mean	Sd			
M1 - T1	2.340	1.056	2.229	1.087	35	1.000	0.324
M2 - T2	2.460	1.010	2.257	0.980	35	1.484	0.147
M3 - T3	1.710	0.893	1.657	0.906	35	0.813	0.422
M4 - T4	1.890	1.132	1.857	1.115	35	0.274	0.786
M5 - T5	2.230	1.140	2.114	1.132	35	0.941	0.353
M6 - T6	2.660	1.110	2.543	1.146	35	1.276	0.211
M7 - T7	2.600	0.976	2.400	1.006	35	1.484	0.147
M8 - T8	2.830	1.043	2.600	1.063	35	1.756	0.088
M9 - T9	1.800	0.964	1.857	1.089	35	-0.495	0.624
M10 - T10	1.860	0.912	1.829	0.985	35	0.442	0.661
M11 - T11	1.660	0.765	1.629	0.808	35	0.298	0.768
M12 - T12	2.000	0.907	1.914	0.919	35	0.770	0.447
M13 - T13	1.890	1.022	2.000	1.029	35	-1.675	0.103
M14 - T14	1.830	0.891	1.857	0.912	35	-0.298	0.768
M15 - T15	1.690	0.963	1.743	0.980	35	-0.813	0.422
M16 - T16	2.260	1.172	2.114	1.207	35	1.537	0.134
M17 - T17	1.710	0.957	1.857	0.974	35	-1.712	0.096
M18 - T18	1.970	1.043	2.114	1.022	35	-1.712	0.096
M19 - T19	2.170	1.071	2.229	1.060	35	-1.000	0.324
M20 - T20	1.570	0.739	1.629	0.770	35	-0.813	0.422
M21 - T21	1.890	1.078	1.800	0.994	35	0.683	0.499
M22 - T22	2.110	1.301	2.000	1.237	35	1.160	0.254
M23 - T23	2.140	1.141	2.143	1.141	35	1.974	0.057
M24 - T24	2.540	1.094	2.371	1.165	35	0.298	0.768
M25 - T25	2.140	1.089	2.114	1.132	35	1.000	0.324
M26 - T26	2.030	1.124	1.971	1.124	35	1.000	0.324
M27 - T27	1.890	1.051	1.800	1.052	35	0.349	0.729
M28 - T28	2.200	1.106	2.143	1.004	35	1.030	0.310
M29 - T29	2.230	1.190	2.057	0.998	35	0.813	0.422
M30 - T30	2.090	0.919	2.029	0.954	35	0.000	0.000

3.2. Validity Analysis

Exploratory factor analysis was performed to assess the construct validity of the scale. As a result of the Bartlett test (X^2=7151,655; df=435; p=0.000<0.05), a relationship was found between the variables included in the factor analysis. As a result of the test (KMO=0.955>0,60), the sample size was sufficient for the application of factor analysis. By choosing the varimax method in applying factor analysis, the structure of the relationship between the factors was kept the same. As a result of the factor analysis, the variables were gathered under four factors with a total explained variance of 52.664%. The factor structure of the scale is presented in the table below:

Table 7. *The Factor Structure of the Literary Curiosity Scale*

Dimension	Factor Load
.... (Eigenvalue=11.695; Explained Variance=17.417; Alpha=0.901)	
M15	0.711
M17	0.710
M11	0.609
M10	0.595
M27	0.594
M18	0.582
M21	0.573
M13	0.561
M20	0.553
M9	0.549
M14	0.503
M26	0.473
.... (Eigenvalue=1.575; Explained Variance=13.786; Alpha=0.859)	
M2	0.742
M5	0.622
M1	0.606
M3	0.591
M12	0.507
M4	0.468
M7	0.453
M25	0.451
.... (Eigenvalue=1.476; Explained Variance=11.182; Alpha=0.778)	
M16	0.618
M23	0.606
M6	0.587
M8	0.569
M19	0.449
M24	0.445
.... (Eigenvalue=1.053; Explained Variance=10.279; Alpha=0.760)	
M28	0.743
M30	0.670
M29	0.626
M22	0.450
Total Variance=%52.664; Overall Reliability (Alpha)=0.945	

"In determining the number of factors in the scale, highly-accelerated decreases in the eigenvalue scree plot are taken into consideration. The factors in which the decreases are horizontal are considered to have less contribution to the variance" (Ebadi, 2020, p. 93). The scree plot concerning the scale factors is presented below.
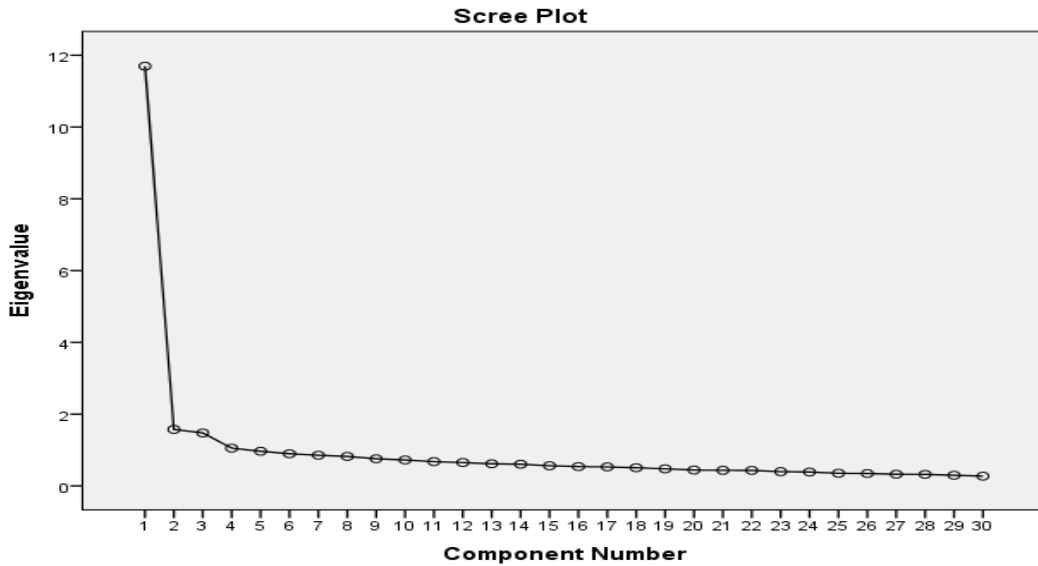
Figure 1. *Literary Curiosity Scale Factor Scree Plot*

In the factor scree plot, it was determined that the scale showed a breakpoint after the first factor; and thus, it was detected that the scale has a single factor structure. The exploratory factor structure of the scale was tested through confirmatory factor analysis on 465 people. The confirmatory factor analysis diagram is presented below:
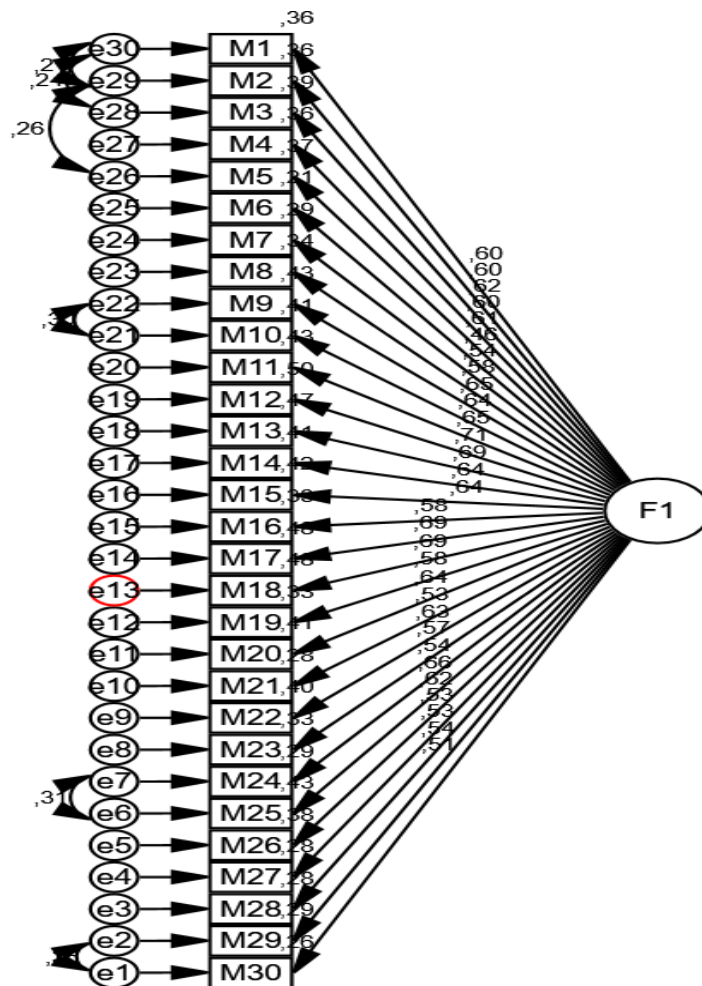

Figure 2. *Literary Curiosity Scale Confirmatory Factor Analysis Diagram*

The goodness of fit measures for confirmatory factor analysis is presented in the table below:

Table 8. *Literary Curiosity Scale Confirmatory Factor Analysis Index Values*

Index	Normal Value*	Acceptable Value **	Literary Curiosity Scale
χ^2/df	<2	<5	(1281.44/399) 3.21
GFI	>0.95	>0.90	0.90
AGFI	>0.95	>0.90	0.90
CFI	>0.95	>0.90	0.90
RMSEA	<0.05	<0.08	0.07
RMR	<0.05	<0.08	0.08

*, ** (Şimşek, 2007; Hooper & Mullen, 2008; Schumacker & Lomax, 2010; Waltz, Strcikland & Lenz 2010; Wang & Wang, 2012; Sümer, 2000; Tabachnick & Fidel, 2007).

The analysis results show that the fit statistics calculated by the confirmatory factor analysis were fit at an acceptable level with the scale's factor structure previously determined. Furthermore, the standardised factor loads, t values, and the explanatorily (*R²)* value constituted of the items are presented below:

Table 9. *Literary Curiosity Scale Factor Loads and Regression Coefficients of the Items*

Items		Factor	β	Std. β	S.Error	t	p	R^2
M30	<---	F1	1.000	0.512				0.411
M29	<---	F1	1.030	0.542	0.086	11.995	p<0.001	0.488
M28	<---	F1	1.000	0.533	0.104	9.590	p<0.001	0.436
M27	<---	F1	0.893	0.530	0.094	9.551	p<0.001	0.442
M26	<---	F1	1.002	0.620	0.095	10.536	p<0.001	0.533
M25	<---	F1	1.125	0.659	0.103	10.908	p<0.001	0.451
M24	<---	F1	1.011	0.538	0.105	9.642	p<0.001	0.444
M23	<---	F1	1.145	0.574	0.114	10.060	p<0.001	0.469
M22	<---	F1	1.181	0.631	0.111	10.641	p<0.001	0.574
M21	<---	F1	0.910	0.525	0.096	9.494	p<0.001	0.412
M20	<---	F1	1.112	0.644	0.103	10.769	p<0.001	0.426
M19	<---	F1	1.098	0.578	0.109	10.100	p<0.001	0.500
M18	<---	F1	1.152	0.694	0.103	11.222	p<0.001	0.470
M17	<---	F1	1.111	0.690	0.099	11.191	p<0.001	0.410
M16	<---	F1	1.066	0.575	0.106	10.069	p<0.001	0.416
M15	<---	F1	1.081	0.645	0.100	10.777	p<0.001	0.569
M14	<---	F1	1.085	0.640	0.101	10.734	p<0.001	0.477
M13	<---	F1	1.100	0.686	0.099	11.152	p<0.001	0.482
M12	<---	F1	1.196	0.707	0.106	11.331	p<0.001	0.611
M11	<---	F1	1.054	0.652	0.097	10.849	p<0.001	0.415
M10	<---	F1	1.032	0.642	0.096	10.745	p<0.001	0.514
M9	<---	F1	1.083	0.654	0.100	10.860	p<0.001	0.533
M8	<---	F1	1.070	0.580	0.106	10.116	p<0.001	0.569
M7	<---	F1	0.900	0.540	0.093	9.667	p<0.001	0.547
M6	<---	F1	0.792	0.457	0.092	8.619	p<0.001	0.555
M5	<---	F1	1.040	0.610	0.100	10.435	p<0.001	0.544
M4	<---	F1	0.977	0.599	0.095	10.319	p<0.001	0.521
M3	<---	F1	1.038	0.624	0.098	10.574	p<0.001	0.533
M2	<---	F1	0.927	0.600	0.090	10.333	p<0.001	0.574
M1	<---	F1	1.089	0.596	0.106	10.287	p<0.001	0.544

When the standardised coefficients were analysed, it was found out that the factor loads were high, standard error values were low, **t** values were significant (p<0.001), and *R²* values were high. These results confirm the construct validity of the factor structure that was previously determined.

The discrimination of the scale and the test-retest findings are presented below:

Table 10. *Differences in Bottom 27% - Top 27% Test-Retest Groups in the Literary Curiosity Scale*

Groups	Bottom 27%		Top 27%		t	p
	Mean	Sd	Mean	Sd		
Literary Curiosity	1.574	0.334	3.466	0.422	-41.775	0.000

Scale scores differed in the bottom 27% and top 27% groups (p<0.05). According to these results, it was found that the scale could make sensitive measurements to distinguish the differences.

4. Conclusion and Recommendations

As can be seen from the literature review, there is no specific study on the relationship between secondary education and literary curiosity. The studies that have been conducted in different disciplines are generally in the context of motivation, attitude, and special interest in a topic and are limited. For instance, the Motivation for Reading Questionnaire (MRQ) designed by Wigfield and Guthrie (1997) is related to curiosity; however, a concept of motivation was not used in depth. In most of the studies, motivation is considered a significant research topic of educational psychology. On the other hand, motivation for reading is considered in terms of native language and foreign language education. However, although many studies conducted in Turkey are concerning motivation, the studies on reading motivation (Ünsal Batum, 2015) and reading curiosity or literary curiosity have been limited to interest, a dimension of motivation.

In his study on literary texts and their features, Aktaş (2009, p. 197) indicates that a literary text is a completed construction that gives aesthetic pleasure to the reader and states that the themes in literary texts are common states of human life and knowledge. Moreover, literary texts include features that can be helpful for other courses as they have rich connotations and are constructed in a way that produces new meanings every time they are read (Aktaş, 2009, p. 199).

With the idea that curiosity emerges from knowledge and that interpreting them as different types of information can reveal different curiosities (Altun, 2016, p. 390), this study aimed to contribute to the buried theory process concerning history curiosity, and a history curiosity classification was made. This study pointed out that Turkish literature was not sufficient for curiosity in undergraduate students.

Arıcı (2008, p. 96)'s study based on interviews concerning why university students dislike reading has affirmed that eager students, who are curious about learning new things, enjoy reading. He also indicated that people feel the need to read to increase their knowledge, have a good time, be curious, get away from real life for some time, enrich their vocabulary, and develop their world of emotions and thoughts.

Ünsal Batum (2015) has asserted that the feeling of curiosity is a piston that triggers the individual, which is important in being motivated for reading. In his dissertation, which included the relationship of curiosity and motivation, he argued that there are items carrying features such as self-efficacy, interest, curiosity, research, questioning, and reading culture at an individual's internal level of reading motivation (Ünsal Batum, 2015, p. 4). Furthermore, Batum (2015, p. 16) has also stated that students can read a book they are not interested in because they are curious about it or for social reasons and has added that reading motivation lies behind this. Therefore, reading interest is a dimension included in being motivated for reading, and this dimension is positioned under the internal motivation title. While the studies in the field are analysed under the themes of reading motivation, reading curiosity, interest in reading, etc., it has been observed that no studies have been carried out on the literary curiosity title.

Kashdan, Rose, and Fincham (2010, p. 303) developed the curiosity and exploration inventory using five independent samples comprising two dimensions. They suggest that curiosity is related to almost every aspect of humans. They also stated that this inventory would be separated from its counterparts (regarding education and psychology), and individual differences concerning curiosity will be considered in the future.

Their study on the relationship between mathematical curiosity and learning, Renesse and Ecke (2017, p. 149) have stated that psychologists have put forward evidence showing that curiosity develops learning. Furthermore, in the light of this evidence, they have found that students become more open to learning when their curiosity about the world around them increases.

Schmitt and Lahroodi (2008) have revealed how valuable curiosity is for knowledge and argued that the feeling of curiosity creates an original desire to know, which provides motivation. In the same study, they have also added that the feeling of curiosity deepens knowledge; it is independent from our fields of interest and widens our knowledge by keeping our attention stable on objects. At the end of their study, they have concluded that curiosity makes education and research easier. The individuals' success in learning and exploration depends on their level of feeling of curiosity. Thus, the idea that curiosity is necessary for education, research, and knowledge can be possible if teachers prefer techniques that arouse curiosity.

In her master's thesis on the problems encountered in Turkish literature and language, and expression courses along with their solutions, Bayazıt (2012) has suggested that the literary texts included in the course books should be selected among the works of prominent authors (which reflect the characteristics of the genre and can arouse curiosity in students).

In this respect, in the present scale development study, the item analyses were examined, and confirmatory factor analysis was performed by examining the scale's factor structure. Additionally, the regression coefficients for the factor loads of the scale and items were presented, and the differences in the bottom 27% and top 27% groups were examined. It was found that the scale could make sensitive measurements to distinguish the differences.

The final form of this scale which was developed to reveal secondary education students' literary curiosity, consists of 30 items, and the responses are scored between 1-5. The score obtained from the scale ranges between 1 and (30*5) 150. An increase in the score indicates an increase in the level of literary curiosity. It is recommended that in academic research, the score determined in this study should be used. At the end of the study, the opinions and assistance of experts in the field (language) and Turkish language and literature teachers should be sought concerning the curiosity score.

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A study of the Attachment Stability of Children Living in Different Family Types (A Longitudinal Study of Children from the Age of 6 to 11)

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ARTICLE INFO	ABSTRACT
	This study aims to analyse the attachment stability of children living in different family types from the age of 6 to 11. The study sample comprises 56 children living in Muş, Turkey, including 28 nuclear families and 28 extended families. The "Incomplete Doll Family Story Scale" was used to evaluate the attachment styles of 6-year-old children. The attachment styles of 11-year-old children were evaluated with the "Kerns Secure Attachment Scale". The analysis revealed that the attachment of 52% of the study group was stable. No changes were observed in the attachment styles of 52% of children living in nuclear families and 47% of children living in extended families, considering attachment consistency in family type. The results show that the attachment levels of children from both family types are significantly consistent from the age of 6 to 11, and the attachment stability of children living in nuclear families is stronger than children living in extended families. © 2021 IJPES. All rights reserved Keywords: Attachment stability; extended family; nuclear family; early childhood; middle childhood

1. Introduction

Bowlby, the pioneer of Attachment Theory, defined attachment as the meaningful emotional tie established between the infant and the caregiver (often the mother) in the first years of life (Bowlby, 1969; 1982; 1988). An important factor in the establishment and development of attachment is the consistent and loving responses given by the caregiver to proximity-seeking infant behaviours such as crying, smiling, and gestures (Main et al., 1985; Cassidy & Berlin, 1994). Timely, consistent, loving responses from the caregiver to the infant and comfort provided often result in secure attachment. On the other hand, late and inconsistent responses given by the caregiver to the infant and lack of love result in an insecure attachment (Bowlby, 1980; Cassidy & Shaver, 1999).

Attachment styles shaped in infancy continue to influence individuals' emotional and behavioural aspects in other periods of life. Attachment experiences, particularly those involving the mother, form the basis of

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individuals' expectations of themselves and other people. Bowlby defined these expectations as internal working models (Bowlby, 1969; 1973). Bowlby (1980) referred to two key aspects of internal working models. The first is whether the infants consider the attachment figure an available, comfortable, and loving adult. The second is whether they perceive themselves worthy of being helped, comforted, and loved. The establishment of a secure attachment between the infant and caregiver affects the development of these two aspects of internal working models favourably, causing the infants to consider the caregiver as an available, comfortable, and loving adult and themselves as individuals worthy of being helped, comforted, and loved (Bretherton, 1985; Bowlby, 1969). On the other hand, insecure attachment affects the development of internal working models unfavourably, causing the infants to consider the caregivers as unavailable and far from comforting and loving, while they perceive themselves as individuals as being unworthy of help, comfort, and love (Bowlby, 1973; Bretherton, 1992).

Internal working models shaped in the early stages of life are driven into the unconscious mind over time and become resistant to change (Main et al., 1985). Internal working models are also generalised to other individuals and direct people's relationships with others (Bowlby, 1969; 1973).

Although Bowlby (1969) implied that attachment styles are initiated and consolidated in early childhood, his theory and most of his clinical studies were based on children's internal working model experiences until adolescence. This is best explained by Bowlby's idea that attachment continues stably. Many short, middle, and long-term studies in the literature on attachment stability aimed to test this idea proposed in Attachment Theory. Granot and Mayseless (2001) and Schmueli-Goetz et al. (2008) concluded that attachment styles in early childhood continue through to middle childhood. A longitudinal study conducted by Seven and Ogelman (2012) revealed that the attachment stability of children from the age of 6 to 9 was 54%. Ammaniti et al. (2000) and Grossmann et al. (2005) identified the stability of attachment styles in their longitudinal study on children from middle childhood to adolescence. Ammaniti et al. (2000) revealed in their longitudinal study that the attachment stability of children from the age of 10 to 14 was 74%. However, other studies in the literature do not support the stability of attachment. Pinquart et al. (2013) found that attachment stability dropped after the preschool period in their meta-analysis study.

Attachment stability is considered to be affected by several factors. The leading factor is the relationship network in the family, which affects the relationship between the child and caregiver. Family roles are quite explicit and clear in nuclear families comprised of parents and children. However, family roles and relationship networks have a more complex nature in extended families that involve grandparents and other close relatives (Marvin & Stewart, 1990). It is particularly believed that living with grandparents affects the quality of the mother-child relationship negatively (İlhan-Ildız & Ahmetoğlu, 2016; Kerns & Richardson, 2005). This study analyses attachment stability from the age of 6 to 11 regarding the nuclear family and extended family variables. Therefore, answers are sought to the questions "Do the attachment styles of children have stability from the age of 6 to 11?" and "Do the attachment styles of children from the age of 6 to 11 depend on whether they live in a nuclear family or extended family?". A literature review reveals that although attachment stability has been a subject of study, the number of researchers that have analysed attachment stability in nuclear and extended families remains limited. Another limitation in the literature is the limited number of longitudinal studies that extend from early childhood to middle childhood.

In a survey conducted on the family structures in Turkey, they were nuclear families, broken families, patriarchal families, and extended families according to the number of spouses in the family and width of the generations (Karslı, 2006). The traditional Turkish family is rooted in the extended family. The nuclear family has emerged as the dominant family type in Turkish society in the last 50 years. However, studies in recent years have found that parents in nuclear families continue to display many behaviours related to the roles in the extended family (Seven & Alabay, 2020). Ilhan-Ildız and Seven (2018) revealed in their study that parents continued extended family attitudes and behaviour patterns towards their children regardless of the dominance of the nuclear family type in Turkish culture. The problem of this study is the attachment stability of children living in nuclear and extended families in Turkish culture from early childhood to middle childhood. From theoretical and cultural perspectives, the study is important due to the limited research on the subject and the description of attachment due to cultural change. It is considered that the results obtained in the study will contribute to the attachment literature and serve as a reference for other researchers.

2. Method

2.1. Research Model

The study was designed in a longitudinal survey model that might be described as semi-experimental. Longitudinal studies aim to collect data from the same person or sample group with the same or similar data collection tools twice or more to detect the change in time in what is measured.

2.2. Participants

The study group comprised 56 normally developing children living with both family structures in Muş, Turkey. 51.7% of the children (n=29) were boys and 48.3% (n=29) were girls. The first evaluation was carried out in the kindergarten in which the children received preschool education. The mean age of the children was 6 (M = 67.9 months, SD = 2.1) in the first evaluation. The second evaluation was carried out 5 years later when the children were attending the 3rd grade of secondary school. The mean age in the second evaluation was 11 (mean age = 11 years; M = 127.9 months, SD = 2.1).

Table 1. *Demographic Data of Nuclear Families*

Socio-demographic Characteristics	Groups	f	%
Number of Siblings	One Sibling	7	25
	Two siblings	21	75
Mothers Education Level	Illiterate	3	10.71
	Primary School	16	57.14
	High school	5	17.86
	Bachelor's degree	4	14.29
Fathers Education Level	Illiterate	1	3.57
	Primary School	7	25
	High school	11	39.29
	Bachelor's degree	9	32.14
Economic Level	Lower	5	17.86
	Middle	20	71.43
	Higher	3	10.71

Socio-demographic data of the nuclear families are displayed in Table 1 above. According to the data, 25% of the children (n=7) had one sibling, and 75% (n=21) had two siblings. In terms of the educational status data of the mothers, 10.71% (n=3) were illiterate, 54.14% (n=16) were primary school graduates, 17.86% (n=5) were high school graduates, and 14.29% (n=4) were university graduates. The educational status data of the fathers shows that 3.57 (n=1) were illiterate, 25% (n=7) were primary school graduates, 39.29% (n=11) graduated from high school, and 32.14% (n=4) were university graduates. Analysis of the economic status of the families indicates that 17.86% (n=5) had low economic status, while 71.43% (n=20) had middle, and 10.71% (n=3) had high economic status.

Table 2. *Demographic Data of Extended Families*

Socio-demographic characteristics	Groups	f	%
Number of Siblings	Two Siblings	13	46.43
	Three Siblings	15	53.57
Mothers Education Level	Illiterate	10	35.71
	Primary School	13	46.43
	High school	4	14.8
	Bachelor's degree	1	3,57
Fathers Education Level	Illiterate	4	14.8
	Primary School	10	35.71
	High school	9	32.14
	Bachelor's degree	5	17.86
Economic Level	Lower	11	39.29
	Middle	14	50
	Higher	3	10.71

Socio-demographic data of the nuclear families are displayed in Table 2. According to the data, 46.43% of the children (n=13) had two siblings, and 53.57% (n=15) had three siblings. In terms of the educational status data of the mothers, 35.71% (n=10) were illiterate, 46.43% (n=13) were primary school graduates, 14.8% (n=4) graduated from high school, and 3.57 % (n=1) were university graduates. The educational status data of the fathers show that 14.8% (n=4) were illiterate, 35.71% (n=10) were primary school graduates, 32.14% (n=9) graduated from high school, and 17.86% were (n=5) university graduates. Analysis of the economic status of the families indicates that 39.29% (n=11) had low economic status, while 50% (n=14) had a middle, and 10.71 (n=3) high economic status. On the other hand, at least two close relatives, such as an aunt, grandfather, or grandmother, live in the extended families. No significant changes occurred in the demographic structure of the children when they turned 11.

2.3. Data Collection Tools

Demographic Data Form: The authors developed this form to collect demographic data of the children and their families. The form includes questions about the children regarding their gender, age (in months), number of siblings, and parents' educational status.

Incomplete Stories with a Doll Family Scale (ISDFS): The Incomplete Stories with a Doll Family Scale (ISDFS) was developed by Cassidy (1988) to identify the attachment styles of 6-year-old children. Seven (2006) developed the Turkish version of the scale. The scale is based on projective stories. There are 6 stories in the ISDFS, and for each story, doll family figures and scale materials are used to present problem situations to children, and they are asked to complete the rest of the story. Each story narration is video recorded and scored from 1 to 5 according to criteria such as whether the children perceive that they have a secure relationship with their mothers, use them as secure bases in stressful situations, and are comforted by their mothers. If the total score received for the stories is between 6 and 17, the attachment style is classified as "fearful", while "18-24 points" are classified as avoidant, and "25-30" points as secure. While adapting the scale to Turkish, the stories were scored by two independent coders, and the Pearson correlation coefficient was found to be .95. The Cronbach's alpha coefficient calculated to evaluate the internal consistency of the scores in the ISDFS is .83. The split-half reliability calculated for the scale scores was .83.

Kerns Secure Attachment Scale (KSAS): The Kerns Secure Attachment Scale was developed by Kerns et al. (1996) to identify children's secure attachment level in the middle childhood period. Sümer and Anafarta-Şendağ (2009) adapted the scale to Turkish. The scale has two separate forms, namely the Kerns Secure Attachment Scale Mother Form and the Kerns Secure Attachment Scale Father Form. The scale has 15 items based on the extent to which children "(a) believe that their attachment figures will be sensitive and available, (b) are likely to trust their attachment figures under stress, and (c) how willing they are to communicate with their attachment figures. Scale scores range between 15 and 60. Higher scores indicate higher secure attachment levels. There is a two-way statement for each item on the scale (Some children... but some children...). Two types of children are described on the right and left of the BUT box, and participants are first asked to decide which type they fit most. Then, they are asked to go to the selected side and state the extent to which they fit the description. The 4th, 9th, 10th, 13th, and 15th items of the scale are reverse coded. While adapting the scale to Turkish, the Cronbach's alpha internal consistency coefficients were found to be .84 for the mother form and .88 for the father form (Sümer & Anafarta-Şendağ, 2009). The Kerns Secure Attachment Scale Mother Form was used in this study, and its internal consistency coefficient was calculated as .91.

2.4. Procedure

Relevant permission was obtained from the Directorate of National Education in Muş province before commencing the study. The kindergarten selected for the practice was a school attended by children of families from a middle socioeconomic level. A parent permission form describing the study's goal, duration, and practice procedure was sent to the parents of normally developing 6-year-old children living with both parents. After receiving parental permission, a total of 56 children were selected for the study, where 28 children were from nuclear families, and the other 28 were from extended families. "Incomplete Stories with a Doll Family" was practised with these children in their schools. On the other hand, the parents were asked to complete the Demographic Data Form. Parents who consented to their child's participation in the scale were

contacted at certain intervals during the procedure. When the children reached 11 years old, permission was again obtained from the Directorate of National Education in Muş to administer the "Kerns Secure Attachment Scale Mother Form" to the study group of children in their schools. A total of 11 different schools were visited to reach the children. In the second practice, the same demographic form was sent to the parents again to determine whether there had been any parental loss, divorce, or significant changes in the socio-demographic features of the families.

2.5. Data Analysis

Data collected were subjected to data analysis. A normality test was applied to the data set in the first stage of the analysis, and the groups' distribution was identified. In the second stage, as different scoring systems were used in the two scales, scoring was performed by converting the raw scores into standard scores. After converting to standard scores, regression analysis was conducted to identify the predictive role of attachment styles, while the ANOVA test was carried out to evaluate the attachment stability.

3. Findings

3.1. Preliminary Analyses Results

The analysis results showed that the arithmetic mean value of the Incomplete Stories with a Doll Family Scale was 19.25, while the median value was 19.00, the standard deviation was 4.9, the skewness value was-.149, and the kurtosis value was -.337. On the other hand, the arithmetic mean value of the Kerns Secure Attachment Scale was 49.5, while the median value was 51, the standard deviation was 7, the skewness value was -1.22, and the kurtosis value was 1.58. Arithmetic mean values and median values are very close to each other, and the skewness and kurtosis coefficients are in the 1.00 range according to the results indicating that scale scores are close to normal distribution. Therefore, it was accepted that both scales had normal distribution values.

The total scores that the children received in ISDFS were separated into three groups: secure, avoidant, and negative attachment styles. ISDFS and Kerns Secure Attachment Scale scores were transformed into standard scores ranging from 1 to 3 for the repetitive measurement ANOVA test. Accordingly, those who received a score under the standard deviation (ISDFS 15, KSAS 42) 1, those who scored over the standard deviation or higher (ISDFS 25, KSAS 58) and were in the 1.00 standard deviation range (ISDFS 16-24, KSAS 43-57) were classified as the avoidant group.

3.2. Distribution of Attachment Styles

The distribution of the attachment styles of the 56 children in the study according to the ISDFS at the age of 6 and KSAS at the age of 11 is as follows: For the 6-year-old study group, the attachment styles were: 46.43% (f=26) had secure, 35.71% (f=20) had avoidant, and 17.86% (f=10) had fearful/negative attachment style. With regard to the 28 children living in nuclear families: 53.57% (f=15) had a secure, 35.71% (f=10) had an avoidant, and 10.71% (f=3) had a fearful/negative attachment style. In the context of 28 children living in extended families, 39.29 % (f=11) had a secure, 35.71 % (f=10) had an avoidant, and 25% (f=7) had a fearful/negative attachment style.

In terms of the distribution of attachment styles of the 6-year-old children according to gender, 48.15% (f=13) of the girls (f=27) had a secure attachment style, 40.74% (f=11) had avoidant, 11.11% (f=3) had a fearful/negative attachment style; on the other hand, while 44.83 % (f=13) of the boys (f=29) had a secure attachment style, 31.03% (f=9) had an avoidant, and 24.14% (f=7) had a fearful/negative attachment style.

Table 3. 6 *Classification of Attachment Styles of 6-Year-Old Children According to Family Type and Gender*

Attachment categories	Type of Family		Gender		Total
	Nuclear	Extended	Boys (29)	Girls (27)	
Negative/ hostile	3 (10.71 %)	7 (25.00 %)	7 (24.14 %)	3 (11.11 %)	10 (17.86 %)
Avoidant	10 (35.71 %)	10 (35.71 %)	9 (31.03 %)	11 (40.74 %)	20 (35.71 %)
Secure/open	15 (53.57 %)	11 (39.29 %)	13 (44.83 %)	13 (48 .15%)	26 (46.43 %)
Total	28 (100 %)	28(100 %)	29 (100 %)	27 (100 %)	56 (100 %)

Table 3 above shows that boys were more likely to be classified as hostile/negative (24.14 % boys and 11.11% girls). Similarly, children from extended families were also more likely to be classified as hostile/negative (25.00% extended, 10.71% nuclear). In contrast, children who lived in nuclear families showed a higher prevalence of secure/open attachment (53.57% nuclear, 39.29% extended).

Table 4. *Predictive Role of The Attachment Styles of 6-Year-Old Children on Their Attachment Styles at The Age of 11 According to Family Type*

	β	R^2	ΔR^2	F
All cases (n = 56)	.519	.269	.255	19.856***
Extended family (n = 28)	.466	.218	.187	7.230**
Nuclear family (n = 28)	.517	.268	.239	9.502**

** $p < .01$ *** $p < .001$

Table 4 above shows the simple linear regression analysis results related to the predictive role of the attachment styles of 6-year-old children on their attachment styles at the age of 11 according to family type. It can be seen in Table 4 that the attachment styles of the 6-year-old children in the study group significantly predicted their attachment styles at the age of 11 (F = 19.85; p < .001). Analysis of the predictive role of the 6-year-old children's attachment styles on their attachment styles at the age of 11, according to gender, reveals that the attachment styles of 6-year-old children of extended families (F = 7.23, p < .01) and nuclear families (F = 9.50, p < .01) significantly predict their attachment styles at the age of 11. According to Table 4, children's attachment styles have significant stability from the age of 6 to 11. A comparison of the stability of attachment styles according to family type reveals that the attachment stability of children in extended families (r = .52, p <.01) is stronger than children living in nuclear families (r = .47, p <.01).

Table 5. *One-Way ANOVA Test Results of Total Attachment Score Stability from The Age of 6 To 11 in The Context of Family Type*

	Years	*M*	SD	*F*	Sig.
All cases (*n* = 56)	6	2.0714	.65663	.161	.690
	11	2.0357	.65663		
Family type					
Nuclear family	6	2.2143	.68622	.074	.787
	11	2.1786	.72283		
Extended family	6	1.9286	.60422	.088	.769
	11	1.8929	.62889		

According to the One-Way Anova Test results presented in Table 5 above, there is no significant difference between the total attachment scores of the study group at the ages of 6 and 11 (F = .16, p > .05). Similarly, Table 5 indicates that there is no significant difference between children in nuclear families (F = .074 p > .05) and children in extended families (F = .088, p > .05) according to their total attachment scores at the ages of 6 and 11.

4. Discussion and Conclusion

This study analyses the attachment stability of children from the age of 6 to 11, according to their family type variable. The simple linear regression analysis results to identify the predictive role of attachment at the age of 6 on the attachment style at the age of 11 showed a significant prediction of 52%. However, according to the One-Way Anova Test conducted to identify the attachment stability between the groups, results show no significant difference between total attachment scores according to family type.

The literature review revealed some studies that support the findings of this research. Pinquart et al. (2013), Fraley (2000), and Ammaniti et al. (2000) reported findings on attachment stability in their longitudinal studies. Bowlby (1969; 1982) suggested in his Attachment Theory that internal working models that determine attachment are likely to be stable throughout life. Therefore, it is possible to suggest that the results obtained in this study overlap the theoretical basis. Additionally, the study results are important as they specifically reveal that attachment follows a stable course from the age of 6 to 11.

Another important conclusion of the study is that children's attachment security and stability in nuclear families is stronger than children living in extended families. The study findings also reveal that children's

negative/fearful attachment rate in extended families is higher than children living in nuclear families. The literature review revealed study results showing that children's attachment security in extended families is unfavourably influenced by the complicated and inconsistent nature of in-family relations (Kerns & Richardson, 2005). Seven and Ogelman (2012) studied attachment stability from the age of 6 to 9 and concluded that the attachment stability of children living in extended families was 47%, while the attachment stability of children living in nuclear families was 59%.

The distribution in terms of gender showed that 7 out of 10 children identified as hostile/negative were boys while the other 3 were girls. This finding shows that boys are more likely to display a hostile, negative attachment style than girls. This finding concurs with other studies in the literature (İlhan-Ildız & Ahmetoğlu, 2016; Diener et al., 2008).

One of the study's strengths is that the selected sample comprised Turkish children who were living permanently with their parents. Many longitudinal studies reported that some children had a multiple attachment experience, and some children went on with their lives with a single parent in the study process. However, this study has several limitations. One of the main limitations is that it was restricted to a specific region. Considering the cultural diversity and family types in Turkey, longitudinal studies could be conducted in different regions with broken families. On the other hand, another limitation of this study might be that multiple attachment styles in the extended family were not taken into account. Several suggestions can be made according to the study results. First, to carry out studies with an increased number of age groups, new scales must be developed to measure parent and child-oriented attachment from early childhood to adulthood, or existing scales must be adapted to Turkish. There are projective attachment scales for early childhood. Projective scales could be strengthened, and scales could be adapted to the Turkish culture to measure attachment in middle childhood.

Consequently, this study reveals that children's attachment from the age of 6 to 11 has stability. This stability was also found to be significant in terms of family type. On the other hand, it was discovered that extended families are more advantageous in terms of children's attachment stability. The findings obtained in this study have contributed to the literature as they both identified attachment stability during the middle childhood period and revealed the effect of the nuclear family type on attachment stability.

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Validity and Reliability of the Solidarity in Pandemics Scale

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ABSTRACT

This study developed a measure of solidarity levels during pandemics, the Solidarity in Pandemics Scale (SPS). This was achieved using a study group of 842 individuals aged between 18 and 65 from different segments of society who had experienced the COVID-19 pandemic and differed in age, gender, and socioeconomic status. Exploratory factor analysis was used to establish the construct validity of the scale, producing a 15-item scale with a one-dimensional structure that explained 34.36% of the variance. Confirmatory factor analysis using a different study group revealed that all items have significant *t*-values, and the model established according to model fit indexes has meaningful and acceptable fit values. The internal consistency of the scale results was calculated using the Cronbach Alpha coefficient, and a reliability of .85 in terms of internal consistency was obtained. Test-retest reliability results as another indicator of reliability were found to be .85. Scores on the Altruism Scale were compared with those on the SPS to evaluate the scale's criterion validity, and a significant relationship was found between the two scale scores. This analysis indicates that the Solidarity in Pandemics Scale is a valid and reliable psychometric tool.

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Keywords:
Solidarity, pandemics, solidarity in pandemics, scale development, validity, reliability

1. Introduction

Pandemics can significantly affect the sociological structure of a society. They cause individuals to experience a range of emotions, such as fear, anxiety, anger, rage, or empathy, and these emotions have the power to shape their social reactions (Blasi et al., 2020; Zou, 2020). Fear, which is frequently evoked by pandemics, is a natural survival-related biological response to threat (Darwin, 1981) and can be contagious (Mobbs et al., 2015). Studies state that high levels of fear can cause major behavioral changes (Harper et al., 2020; Witte & Allen, 2000; Maddux & Rogers, 1983). Heightened fear can make individuals prone to defensive reactions (Blondé & Girandola, 2019), and anxiety and fear can also provoke hostile feelings and behaviors.

Placing blame for a pandemic on specific ethnic groups or social classes can lead to hostile behaviors toward those groups. During historical plague epidemics in Europe, certain ethnic groups, poor individuals, and beggars were held responsible for the spread of the plague, and anger was directed toward them (Cohn, 2012). Prejudice and attacks against individuals of Far Eastern origin during the COVID-19 pandemic are further examples of this hostility (Jakovljevic et al., 2020). Fear and anxiety drove people to loot markets, taking more

stock than they actually needed (Stiff, 2020). Seeing others as competitors for limited supplies causes individuals to focus solely on their own interests (Van Bavel et al., 2020).

Conversely, pandemics and social disasters may also be periods when prejudices decrease and solidarity comes to the fore, as they trigger the perception of a shared destiny (Kokudo & Sugiyama, 2020). When every member of a society faces the same risk, individuals support each other to eliminate the threat. They reorganize into a single community with a common destiny, and this brings strong cooperation, partnerships, and channels of solidarity. The preliminary aim of this reorganization is to ensure equality for all and participating in activities that contribute to the well-being of others is valued (Dovidio et al., 2007).

There are many examples of individuals devotedly trying to help others in emergencies and disasters. This solidarity is expressed through charity among individuals or through civil or state institutions and organizations. According to a CIVICUS report (November, 2020), after the declaration of COVID-19 as globally pandemic, many civil societies declared a state of emergency and met the needs of their populace not only for basic supplies (food, clean water, toilet paper, etc.) but also for information about protecting themselves from COVID-19 and stopping the spread of the virus. After the initial shock of panic and crisis, people with a sense of solidarity calm down and look for solutions not just for themselves but also for others. Experiencing a common catastrophe encourages the emergence of a common sense of identity, an "us," and recognition of a common anxiety. This perspective leads people to act for the common good (Genschel & Jachtenfuchs, 2021). During the COVID-19 pandemic, solidarity has emerged not only in individuals but also at the country level, meeting urgent needs for information and supplies (WHO, 2021). This phenomenon, defined as social solidarity, was discussed in detail by Durkheim. He saw social order and solidarity as important to the functioning of society (Durkheim, 2006). Within his framework, solidarity within small or large communities enables individuals to maintain their continuity, and therefore communities develop solidarity when facing threatening situations.

Solidarity within a society can be expressed in various ways. It can be seen in explicit actions like collecting money for people in need or more subtly, for instance, by wearing face masks. Cheng (2020) argued that the use of masks for public health is an example of solidarity because it is done not only for the individual's own health but also for that of other individuals in the society. Various expressions of solidarity during COVID-19 pandemic have been documented. People have offered mental support to sick people and/or healthcare workers (Erikan, 2020, March); anonymous philanthropists have paid off the grocery-store debts of people living in low-income neighborhoods (CNNTURK, 2020, January); and municipalities have provided food to people in need (Hurriyet, 2021, January). As well as its direct effects, solidarity is seen as a way of preventing the rise of negative feelings such as hostility, discrimination, or alienation during pandemics. These negative feelings could be directed toward those of different ethnic or age groups and result in group-directed hostility. Prohibitions, especially for young and old people, may cause those groups to be held responsible for the spread of the virus. Ayalon et al. (2020) highlighted the discrimination faced by the elderly during pandemics and drew attention to the importance of enhancing intergenerational solidarity during the COVID-19 pandemic for preventing ageism.

Although a pandemic is medically defined, it is a phenomenon with psychological and sociological aspects, and it shapes societies with these aspects. Threat and uncertainty affect the mental well-being and social perspectives of individuals who have gone through a pandemic (Karataş, 2020). Most of the measures taken in a pandemic are within the framework of social life and, therefore, have major repercussions for socialization and awareness of the existence of others. Solidarity, which is an important part of socialization, shows a distribution from regional to global in pandemics. The World Health Organization has proposed that global solidarity is one of the most powerful ways of stopping the COVID-19 pandemic (WHO, 2020).

Because continuing a psychically and mentally healthy life is the second most important aim after being alive, post-traumatic growth is an essential factor to consider in disasters. People should be able to go on with their lives and maintain the functional construct of society. Karataş (2020) found that individuals who felt a sense of solidarity during the COVID-19 epidemic were more likely to grow after trauma and stated that achieving post-traumatic growth is an important variable for healthy, developing societies. Altın (2020) stressed the importance of solidarity in supporting the elderly, especially in the current pandemic, and emphasized how effective solidarity is in supporting this group, who have a higher risk of death and may live far from relatives.

By protecting those in need, people can view themselves as constructive rather than devastated (Bayerts, 1999). This perspective helps them achieve post-traumatic growth (Rime et al., 2010).

The abovementioned studies indicate that solidarity is extremely important to every dimension of society's well-being. Studying solidarity in a scientific context is thus sociologically and psychologically valuable. A means of measuring solidarity is needed to enable such study, and indeed, some such tools exist, such as the Intergenerational Normative Solidarity Scale (Öztürk & Hazer, 2016), Altruism Scale (Ümmet, et. al., 2013), and Personal and Social Responsibility Scale (Filiz & Demirhan, 2015). However, we believe the literature will benefit from a scale that is focused on the level of solidarity in individuals during pandemics and that recognizes the importance of online support systems. We therefore aimed to develop such a scale, using the definition of solidarity current since the 19th century; that is, unity with humanity and mutual support (Bayertz, 1999).

2. Methodology

2.1. Research Model

This is a scale-development study for a measurement tool to determine the level of solidarity of individuals during pandemics.

2.2. Study Group

Because this study aimed to develop a scale, a study group was formed considering the steps of scale development and the structure of the scale. The structure of the scale dictated that the study group include individuals differing in gender, age (ranging from 18 to 65), and socioeconomic status, who had experienced a pandemic. Data were collected online using a Google document between November 2020 and January 2021. Data collection proceeded through four stages relating to four steps of scale development, each with different numbers of participants.

The first of these stages was the exploratory factor analysis (EFA), which was performed to reveal the factor structure of the scale. Comrey and Lee (1992) indicate that factorization based on 50 observations would be very weak; 100, weak; 200, unstable; 300, good; 500, very good; and 1000 and above, ideal. After removing outliers, the study group for the first stage totaled 410, which is adequate based on that guidance. The group was 33.2% (136) male and 66.8% (274) female. In the second stage, a working group was formed to test the accuracy of the structure via confirmatory factor analysis (CFA). The size of the study group is important for producing accurate results via the CFA estimation method. Although there is no consensus on optimal group size in the literature, a minimum of 10 times the number of items or a minimum 200 participants is commonly adopted (Kline, 2005). After removing outliers, the second-stage study group consisted of 316 individuals, which is sufficient according to the abovementioned rule of thumb. The gender split of the group was 20.9% (66) male and 79.1% (250) female. Finally, in the third and fourth stages, the criterion validity and test–retest reliability of the scale were evaluated separately in 63 and 53 individuals, respectively. Thus, the total study group comprised 842 individuals. Table 1 lists the stages of the study, detailing the number of participants and the procedures performed with their data.

Table 1. *Study Stages*

Stage	Scale/Scales Applied	Statistical Procedures Performed	Number of Individuals
1	SPS	EFA to assess construct validity and test of internal consistency	410
2	SPS	CFA to assess structure validity	316
3	SPS and AS	Calculation of the relationship between the scores of two scales to assess criterion validity	63
4	SPS	Calculation of the relationship between first and second applications to assess test-retest reliability	53

SPS: Solidarity in Pandemics Scale; AS: Altruism Scale; EFA: exploratory factor analysis; CFA: confirmatory factor analysis

2.3. Data Collection Tools

Demographic form: This form gathered demographic data from participants, including their gender, age, grade, and perceived income. It contained brief information about the data collection process and requested informed consent for participation.

Solidarity in Pandemics Scale (SPS): This scale was developed by the authors. It consists of 15 items probing solidarity in pandemics, with responses made on a five-point Likert scale. There are no reverse-coded items, and higher scores indicate higher levels of solidarity.

Altruism Scale (AS): This scale was used to assess criterion validity. It was developed by Rushton et al. (1981) and consists of 20 items answered on a five-point Likert-type scale. This study used the version adapted to the Turkish culture by Tekeş and Hasta (2015). The scale contains no reverse-coded items, and higher scores indicate higher levels of altruism. The Turkish version of the scale has Cronbach's Alpha values of .81 and .70 for the helping and philanthropy subscales, respectively. The scale has a split-half correlation coefficient of .74 and test-retest reliability of .83.

2.4. Procedure and Data Analysis

The first step of the scale-development process was to explore the relevant literature in Turkey and abroad regarding the structure of the concept of solidarity and solidarity in pandemics and its possible indicators. Based on this literature review, the researchers wrote 23 essay items thought to represent the concept of solidarity during pandemics and to cover its full scope. The number of items for the trial was kept relatively high to avoid problems of low internal consistency (DeVellis, 2014). The 23-item trial questionnaire was sent to six experts, two of whom were experts in guidance and psychological counseling, two in assessment and evaluation, and two in the Turkish language, for their opinions. Items judged by the experts as unrepresentative of the concept of solidarity, unsuitable for the structure of the Turkish language, or ambiguous were revised or removed from the scale. The content validity of the items was calculated separately for all items as one minus the ratio of the number of positive opinions received from experts to half of the number of experts (Veneziano & Hooper, 1997). Any item with a content validity rating of less than .80 was removed from the scale. The resulting trial scale consists of 21 items. Item responses are given on a five-point Likert-type rating scale (``strongly disagree "1," disagree "2," undecided "3," agree "4," and strongly agree "5").

Prior to the operations performed at each stage, erroneous values were corrected and outliers were excluded. First, EFA was conducted to obtain evidence for the construct validity of the scale. Items with factor load values below the threshold value of .32 (Kline, 2011; Tabachnick & Fidell, 2007) were excluded from the scale. Cronbach's Alpha coefficient was then used to assess the reliability of the scale in terms of internal consistency. The range from .70 to .80 (Cortina, 1993; Crocker & Algina, 1986; Streiner, 2003) was taken as an acceptable lower limit for this coefficient. Additionally, test item correlations were used to obtain evidence on item validity, and independent-samples *t*-tests were used to reveal whether each item could distinguish between those with the feature to be measured or not.

In the second stage, CFA was used to test the scale structure obtained in the first stage. The significance of the *t*-values obtained as a result of the analysis indicates the compatibility of the items in the scale with the model, whereas the fit indices provide information about whether the model obtained is compatible with the theory as a whole (Munro, 2005; Schumacker & Lomax, 2010; Waltz, Strickland & Lenz, 2010). We used these indicators to gather evidence regarding whether the scale would give the same structure in groups with similar characteristics.

The third stage was to evaluate the criterion-based validity by calculating the Pearson correlation coefficient between SPS scores and AS scores. The AS measures altruism, protecting another person's welfare without expecting anything in return. Because both altruism and solidarity consist of activities, beliefs, and thoughts benefiting others, high levels of correlation were expected between scores on these two scales. Finally, in the fourth stage, test–retest reliability was assessed by having the same individuals complete the SPS twice two weeks apart and calculating the Pearson correlation coefficient between the scores obtained from the two applications.

2.4. Ethical

Ethics committee approval for the study was received from the ethical committee of Okan University, Turkey, on 11/11/2020. The privacy of all participants was protected, and confidentiality requirements for data collection and analysis were strictly followed. Thus, this research study complies with research publishing ethics. The authors declare no conflicts of interest.

3. Findings

3.1 Scale Structure and Validity

Before EFA was performed, the suitability of the data for structure-detection via that method was assessed by calculating the Kaiser–Meyer–Olkin (KMO) coefficient and performing Bartlett's test of sphericity. The KMO value was .84, where values of .80 and above can be considered to indicate perfect fit (Büyüköztürk, 2002). The chi-square test statistic ($\chi2$ = 1574.49, SD = 105, p = 0.00) obtained through Bartlett's test of sphericity was statistically significant. These results indicate that the data are suitable for factor analysis.

Alpha factorization was next used to determine how the items were factored, in line with criteria in the literature. These criteria are the factor's eigenvalue being at least 1 (Thompson, 2004), with a higher eigenvalue indicating more variance (Tabachnick & Fidell, 2014); sharp drops, high acceleration, and relative flattening after the cut-off point in a plot drawn on the basis of eigenvalues (Fabrigar et al., 1999); common variances of the items of at least .40 (Field, 2005); and no two items having a load below .10 on the same factor (Büyüköztürk, 2002; Çokluk et al., 2010). These requirements can be summarized as having at least three items under any factor and the items that load the factor being consistent in terms of meaning and content (Velicer & Fava, 1988). Based on the criteria, six of the 21 items were removed from the scale, and the remaining 15 items were found to represent a single-factor structure compatible with the theoretical framework. The total variance explained by this structure is 34.36%. For social sciences, 30% explained variance can be considered sufficient for a one-dimensional structure (Çokluk et al., 2012). The factor loadings and common factor variances of the items are given in Table 2.

Table 2. *Factor Structure and Factor Loadings of The Scale*

Item No.	Factor Load	Factor Common Variance
M10	.741	.542
M9	.733	.531
M14	.716	.509
M12	.707	.506
M13	.684	.460
M4	.631	.402
M8	.598	.364
M15	.543	.291
M20	.531	.284
M11	.504	.250
M3	.500	.243
M17	.484	.233
M18	.480	.228
M21	.440	.203
M5	.424	.196
Total Variance Explained %34.36		

Confirmatory factor analysis (CFA) was used to verify the unidimensional structure of the 15 items revealed by EFA. The CFA was carried out on the data of the 316 individuals in the second-stage study group. The goodness-of-fit indices were improved by making modifications that were selected by examining the contents of the items based on modification suggestions. The analysis was completed by defining error covariances among items M10-M9, M14-M13, M18-M17, M21-M20, M9-M8, and M17-M15. Table 3 compares the goodness-of-fit indices to the criteria commonly used in the literature (Tabachnick & Fidell, 2007) and indicates the conclusions reached regarding fit.

Table 3. *Comparison of Perfect and Acceptable Values For Fit Indices With The Fit Index Values Obtained*

Investigated Fit Indices	Perfect Fit Values	Acceptable Fit Values	Achieved Fit Indexes	Result
$\chi2/sd$	$0 \leq \chi2/sd \leq 2$	$2 \leq \chi2/sd \leq 3$	2.56	Acceptable Fit
GFI	$.95 \leq GFI \leq 1.00$	$.90 \leq GFI \leq 95$	.92	Acceptable Fit
AGFI	$.90 \leq AGFI \leq 1.00$	$.85 \leq AGFI \leq .90$	.88	Acceptable Fit
CFI	$.95 \leq CFI \leq 1.00$	$.90 \leq CFI \leq .95$	.96	Perfect Fit
NFI	$.95 \leq NFI \leq 1.00$	$.90 \leq NFI \leq .95$	.93	Acceptable Fit
NNFI	$.95 \leq NNFI \leq 1.00$	$.90 \leq NNFI \leq .95$	.95	Perfect Fit
IFI	$.95 \leq IFI \leq 1.00$	$.90 \leq IFI \leq .95$	.96	Perfect Fit
RMSEA	$.00 \leq RMSEA \leq .05$	$.05 \leq RMSEA \leq .08$	.070	Acceptable Fit
SRMR	$.00 \leq SRMR \leq .05$	$.05 \leq SRMR \leq .10$	.055	Perfect Fit
PNFI	$.95 \leq PNFI \leq 1.00$	$.50 \leq PNFI \leq .95$	.74	Acceptable Fit
PGFI	$.95 \leq PGFI \leq 1.00$	$.50 \leq PGFI \leq .95$	.64	Acceptable Fit

$\chi2=215.13$, SD=84, for RMSEA %90 Probability Confidence Interval = (0.059; 0.082)

As demonstrated in Table 3, seven of the 11 indicators are acceptable, and four of them fit perfectly. The significance of the standardized analysis values of each item in the scale was assessed by examining *t*-values. The *t*-values vary between 6.08 and 13.63. As they are all higher than 2.58, they can be interpreted as meaningful at the p < .01 level (Kline 2011). Thus, the goodness-of-fit values and *t*-values indicate that all of the items should be included in the scale and confirm the structure as a whole. The measurement model of the one-dimensional structure and the factor loads (ranging .36–.71) are given in Figure 1.
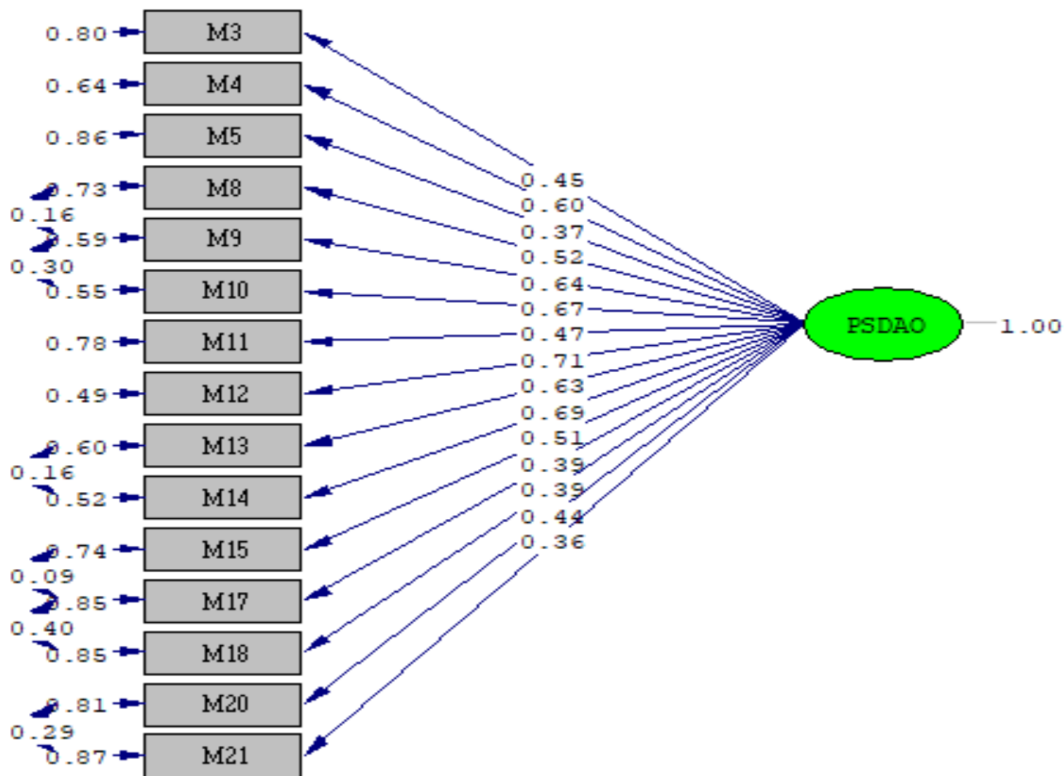

Figure 1. *SPS Measurement Model*

To determine the criterion-based validity, the SPS and the AS, which is thought to serve a similar purpose to the SPS, were applied to the 63 individuals in the third-stage participant group. Pearson correlation analysis was performed on the results obtained from the two scales and found a positive, significant relationship between them ($r = .54$, $p < .01$). This result indicates that the SPS has criterion-based validity.

3.2 Scale Reliability

Cronbach's Alpha was used to determine the reliability of the scale in terms of internal consistency, and the test–retest method was used to determine its reliability in terms of stability. The Cronbach's Alpha reliability coefficient calculated by applying the scale to the second study group is .85. Generally, higher values of alpha indicate greater internal consistency between items in a scale, with a close approach to 1 desirable (Erkuş,

2017); therefore, the internal consistency of the scale is sufficient. Moreover, scores on the two applications of the scale two weeks apart demonstrated a strong positive correlation (*r* = .85, *p* < .01), indicating that the scale has good test-retest reliability.

3.3 Item Statistics

Item-total correlations were calculated, and 27% lower-upper group comparisons were made to determine whether the SPS items are good measures and distinguish between individuals. The relevant values are given in Table 4.

Table 4. *Results of Item Analysis*

Item No	Mean	SD	Corrected Item-Total Correlation	Alpha If Item Deleted	t
M3	4.10	1.00	.417	.846	33,42
M4	4.01	0.95	.540	.839	43,52
M5	3.39	1.22	.359	.851	36.07
M8	3.81	1.07	.498	.841	39.15
M9	4.34	0.79	.626	.836	25.45
M10	4.09	0.91	.637	.834	51.31
M11	3.85	1.12	.421	.846	33.20
M12	4.23	.87	.606	.836	25.95
M13	3.83	1.03	.579	.836	34.84
M14	4.06	1.01	.619	.834	35.47
M15	4.45	.72	.441	.845	21.96
M17	4.06	.86	.393	.846	47.48
M18	4.16	.86	.393	.846	29.26
M20	4.10	1.02	.459	.843	31.59
M21	3.73	1.14	.389	.848	34.80

According to Table 4, the item-total correlations of the scale items vary between .389 and .637. These values indicate that the items differentiate individuals regarding the measured property. The differences between the item scores of the 27% lower and upper groups were examined with the independent-samples *t*-tests. The resulting *t*-values ranged from 21.96 to 51.31 and were significant (*p* < .01). The more dissimilar the lower and upper groups of 27% representing the two ends of the distribution, the more sensitive is discrimination (Özgüven, 2011). Therefore, the *t*-values obtained can be considered further proof that the items distinguish between individuals with and without the measured feature.

4. Discussion and Conclusion

Pandemics such as COVID-19 affect social health in terms not only of physiological well-being but also of community mental well-being and social structure (Chakraborty & Maity, 2020; Bostan et al., 2020). Understanding the changes that this causes to communities is of interest for the future. Tools for measuring societal changes are therefore needed so as to investigate these social health effects cross-sectionally and longitudinally. Although survival-related processes such as pandemics mostly trigger changes in negative variables, variables such as solidarity and coexistence should not be ignored. A measurement tool that enables the examination of the solidarity-related structures formed by individuals during pandemics was missing from the literature, and this study aimed to develop such a scale.

The term "solidarity" has been used for different definitions of community tied to different types of bonds. In the past, solidarity was viewed as existing within kinship groups and had a similar meaning to fraternity. However, solidarity is now commonly used to mean a "wide ranging universalistic understanding of a community," similar to "ethical universalism" (Bayertz, 1999; p.5). The wording of the items in the scale aimed at evaluating the level of this sort of solidarity in people who have been through the conditions specific to pandemics. We aimed to evaluate the feeling of responsibility of the community for the individual and that of the individual for the community, like Durkheim's social perspective on solidarity (Durkheim, 2006). Although the scale could have been prepared with a two-factor structure comprising individual responsibility and community responsibility, we believe that, because pandemics are situations that every individual faces

in a community, items should analyze the responsibility of both the individual and the community. A one-factor structure was thus a valid and reliable way to evaluate an individual's overall solidarity level, and the study results paralleled this theoretical framework.

The construct validity of the scale was evaluated via EFA and CFA. The items shown by EFA to have insufficient factor loading (0.32; Kline, 2011) were removed from the scale, and a unidimensional scale with 15 items was created. This one-dimensional scale explains 34.36% of the total variance. The fit indices obtained via CFA confirmed the sufficiency of this single-factor structure with 15 items. Moreover, the *t*-values obtained were significant, indicating that all the items are compatible with the model and should be included in the scale (Byrne, 2010). The scale's criterion validity was assessed by applying the SPS and AS to the same participants and calculating the Pearson correlation between the two sets of scores. A positive average level significant correlation was obtained that was in excess of the .50 level expected for the correlation between two similar factors (Şencan, 2005; Taylor, 2013). Hence, SPS and AS scores demonstrated a good level of correlation, and the scale's criterion validity was confirmed.

The test–retest reliability method was calculated by means of the Pearson correlation coefficient, and a strong positive correlation was observed. Moreover, the Cronbach's Alpha reliability coefficient, which is an indicator of reliability in terms of internal consistency, was .85 ($p < .01$). The literature states that reliability coefficients in the range of $\alpha = .70–.80$ are acceptable (Crocker & Algina, 1986; Fraenkel, Wallen & Hyun, 2012). These results demonstrate that the reliability of the scale is high.

The degree to which the items predict the total score and are distinctive was investigated by calculating the corrected item-total score correlations and making 27% lower-upper group comparisons. Where 27% lower-upper group comparisons are carried out via independent-sample *t*-tests, the test significance is evidence for the discrimination of the items. For item-total score correlations, those with a value above 0.30 are considered to sufficiently distinguish the measured feature (Erkuş, 2012). The *t*-values obtained were significant for 15 items, and item-total score correlations varied between 0.39 and 0.64. These results demonstrate that the items are distinctive, bolstering the conclusion that the SPS is a valid and reliable tool for measuring solidarity.

Akın (2018) pointed out that, during a historical plague epidemic in Europe, administrative structures, and especially the church, sought to cement society and cope with the destruction caused by plague by trying to strengthen solidarity throughout society by stressing that all its members were in the same sinking ship. People often rely on solidarity to hold society together when faced with a crisis. In pandemics specifically, people need to support each other to get through a period when a virus threatens not just their physical health but also their mental health and social well-being (Ho & Dascalu, 2020; Galang et al., 2021). Similarly, the analysis of the items of the scale developed in this study showed that people tend to help others in every way that they can. Thus, the solidarity of those experiencing the COVID-19 pandemic is significant, and item loadings are high.

The scale items were written to cover a wide spectrum from physical assistance to online help, and the analysis indicated that all these items were significant. This highlights the importance of the online medium for solidarity during crises. Özarslan (2012) reported that after the Van earthquake in Turkey, even individuals who did not experience the earthquake, especially young people, discovered new solidarity systems through supporting the earthquake victims on social media. These solidarity systems led to a distinct change in the social structure. Maryani (2018) noted that changes in communication technology mean that solidarity is now being developed through digital media. Hence, by including different avenues of support (e.g., digital media, social media) and support systems specific to pandemics, we believe that this scale will be a helpful tool for working with the new types of social support that have emerged or gained more attention after the current pandemic.

In this scale, we aimed to stress different aspects of solidarity like social support, economic support, and support to reach the sources of support. Because the impact of social media is growing, especially in recent years, we also included items related to the support given through social media, which can trigger social solidarity. Thus, this scale has unique characteristics that are suitable for the present time period and pandemic.

The strengths of the study are that it presents more than one piece of evidence for the validity and reliability of the scale and has a large number of participants (842). However, most of the participants are women, and all are young adults or adults. These are limitations of the study, and further studies based on age and gender differences would be helpful to understand how different factors affect solidarity levels in pandemics. Another limitation is the small number of participants with low socioeconomic status. Although the data were collected from different cities of Turkey and from people of different socioeconomic statuses, the number of participants with very low socioeconomic status was limited. Even if it may be difficult to reach such people, studies applying the scale in data sets with better coverage of socioeconomic status would be desirable. Finally, the data were collected from members of the Turkish culture, which is considered collectivistic; thus, information gained from the data is applicable only to Turkish culture. Still, we believe this scale will be a very helpful tool for future studies.

5. Recommendations

This study developed a scale for assessing the solidarity levels of adults. Because pandemics affect members of every age group, the development of tools to assess the solidarity levels of children, adolescents, and the elderly would be a beneficial contribution to the field. We believe solidarity is an important phenomenon within societies, so studies are needed that elucidate the factors that influence solidarity levels. We also believe that studies conducted in different cultural groups would be beneficial to understanding the cultural perspective of solidarity.

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The Effect of The POW + C-SPACE Strategy on Writing Skills of Students with Specific Learning Difficulties Attending Classes in the Resource Room

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ARTICLE INFO | ABSTRACT

In this study, the POW + C-SPACE (Pick my idea - Organise my notes - Write and say more + Characters – Setting – Purpose – Action – Conclusion - Emotions) strategy shaped on the basis of the Self-Regulated Strategy Development Model (SRSDM) was presented through teachers working in the resource room, to evaluate the effects on story-writing skills of the students with Specific Learning Difficulties (SLD). The study was designed with the multiple probe model with probe phase between subjects. The independent variable of the research is the POW + C-SPACE strategy presented through the teachers working in the resource room. The dependent variable is the story writing levels of the children with SLD who are educated in the resource room. The study group consists of three teachers and their students with SLD in the resource room. The POW + C-SPACE strategy was presented to the students with SLD through the teachers working in the resource room. As a result of the study, it was concluded that when the teachers in the resource room presented the POW + C-SPACE strategy, it effectively developed the students' story writing skills.

1. Introduction

Human beings have biological, psychological, social, spiritual, and economic aspects that are interrelated and affect one another constantly, shaping a person. All these aspects and each human being live in a multi-layer context from a micro-systems level to a chronological-systems level. Taking a contextual perspective in addition to biological aspects is important to understand and develop evidence-based programs for children with SLD (Öğülmüş, Acikgoz, & Tanhan, 2021). SLD is a type of inadequacy that causes difficulties in acquiring and processing information, remembering strategies, understanding their environment, problem-solving, understanding and using language, and making connections between thoughts (Talbot, Astbury & Mason, 2010). SLD has exclusionary diagnostic factors that differ from mental disability, hearing impairment, visual impairment, or not knowing the region's language (American Psychiatric Association [APA], 2013). To talk about the existence of SLD, although the cognitive potential of a child is within the normal range, the child should not be able to show the expected performance in some academic areas. At the beginning of primary school, while their peers learn basic academic skills such as reading, writing, and mathematics at the scheduled times, children with SLD cannot learn these skills at the expected time. Writing skills are especially seen as

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one of the most complex literacy activities for adults and children (Troia & Graham, 2003). When writing skills are mentioned, they should not solely be understood as handwriting or writing letters following their forms (Ilker & Melekoğlu, 2013). Explaining and conveying thoughts can also be accomplished through writing (Gerde, Bingham & Wasik, 2012). Writing is defined as a language activity that occurs with the combination of many different components such as the mind, fine motor skills, sense, and understanding, and students are expected to have such writing skills to reveal what is expected of them in school life (Rosenblum, Weiss, & Parush, 2003). Any student needs a good writing skill in an average of 30-60% of a school day (McHale & Cermak, 1992). To academically succeed, students must demonstrate writing skill sufficiently (Kuşdemir, Kurban & Bulut, 2018). While children with normal development generally exhibit this skill at an adequate level, children with SLD cannot exhibit this skill sufficiently compared to their normally developing peers. It is stated that students who develop effective writing skills during their school years have a significant advantage over those who do not develop their writing skills in later life (Graham & Perin, 2007). It is thought that the more the writing skill is developed at an earlier period, the more this will affect the future academic life of the children with SLD.

Several models and strategies are used to improve writing skills in which children with learning difficulties experience limitations and to enable them to benefit from learning environments more effectively (Öğülmüş et al., 2021). The most common models are mainstreaming education and resource rooms. Mainstreaming education has been implemented in Turkey since the early '80s (Batu, Çolak & Odluyurt, 2014), and its importance in the following years has increased more with the increase in SLD awareness (Öğülmüş, 2018). However, the resource room is a newer model compared to mainstreaming education. Resource rooms are educational environments that aim to support individuals with special needs in schools where general education services are carried out. In resource rooms, special education experts provide services to students with special needs individually or as a group (Batu & Topsakal, 2003). Children have benefited from resource rooms for their reading, writing, and mathematics difficulties, and they continue to benefit from them today (McNamara, 1989). Education offered for one-to-one or small groups creates a positive basis for implementing strategies developed to support the writing skills of children with SLD. There are other scientifically based models (İlker & Melekoğlu, 2013) developed to support writing skills in such environments. One of these is the Self-Regulated Strategy Development Model (SRSDM).

SRSDM is a model that brings together highly effective strategies that enable students to organise themselves in the writing process that requires planning, reviewing, and producing (Harris, Graham, Mason, & Friedlander, 2011). Based on this model, researchers found many strategies that have proven effective such as POW+WWW, POW+TREE, STOP & DARE, PLANS, PLAN+WRITE (Al Shammari, 2018; De La Paz, Owen, Harris, & Graham, 2000; Ennis, Jolivette & Boden, 2013; Hoover, Kubina & Mason, 2012; La Mboi, 2020; Mason & Shriner, 2008; Tika, 2015). One of the most frequently used is the POW + C-SPACE strategy. This strategy was adopted by Öğülmüş (2018) based on SRSDM, and the strategy gives very effective results in developing the story writing skills of children with SLD. Considering that the writing skill is of great importance for the primary school and future academic life of the individuals, it is thought that the implementation of the POW + C-SPACE strategy in resource rooms is essential. When the related literature is examined, its effectiveness has been proven by many studies (Ballard & Glynn, 1975; Budak, 2016; Chalk, Hagan-Burke & Burke, 2005; Graham, Harris, & Mason, 2005; Özen, 2016; Rogers & Graham, 2008; Uygun, 2012; Zumbrunn & Bruning, 2012). However, no study proves the effectiveness of the strategies shaped based on SRSDM on students with SLD in the resource room. On the other hand, while many studies have been conducted on students with different types of disabilities who study in the resource room (Affleck, Adams & Lowenbraun, 1988; Akay, Uzuner & Girgin, 2014; Glomb & Morgan, 1991; Şahin & Güler, 2018; Vaughn & Bos, 1987), there is a limited number of studies on SLD students studying in the resource room.

Regarding all these points, taking a contextual approach, the purpose of this study is to determine whether the POW + C-SPACE strategy effectively develops the story-writing skills of children with SLD when presented in resource rooms through teachers, who were trained through online platforms. Experts in special education and related research also called for more evidence-based services for the children with special needs and their parents (e.g., Özekes, 2013). For this purpose, answers to the following questions were sought:

1. Are participating teachers able to reliably apply the POW + C-SPACE strategy to their students with SLD?

2. Is the POW + C-SPACE strategy presented by the teachers in the resource rooms effective in improving the story writing skills of students with SLD?

3. Does the POW + C-SPACE strategy presented to students with SLD through teachers in resource rooms cause permanent student performance changes?

4. What are the teachers' opinions participating in the research on the effectiveness of the strategy used?

5. What are the children's opinions participating in the research on the effectiveness of the strategy used?

2. Method

2.1. Research Model

This research was carried out with a single subject research model. Single-subject studies are quasi-experimental research models that include the interpretation of findings related to a subject (Büyüköztürk, Kılınç Çakmak, Akgün, Karadeniz, & Demirel, 2018; Tekin-İftar, 2018). Single-subject research models are suitable models to be used in cases where a single experiment needs to be examined intensively for a while and in studies conducted on individuals with significant differences from the others (Büyüköztürk et al., 2018). In this study, a multiple probe model with a probe phase between subjects, a single-subject research model, was used. The multiple probe model with probe phase between subjects is a research model in which the effectiveness of an independent variable on three subjects is examined. This model aims to bring the same behaviour to three different participants in the same environment or eliminate it in three different participants (Tekin-İftar, 2018). Experimental control in this study was established because there was no change in trends and data levels before the independent variable was applied to all participants. The change was only due to the application of the independent variable.

2.1.1. The dependent variable

The story writing levels of the students with SLD was the dependent variable in the study. The story writing levels of the students were measured by scoring the stories they wrote in the last lesson of each practice session.

2.1.2. Independent variable

The independent variable of the research is the POW + C-SPACE strategy applied by the teachers in the resource room. The POW + C-SPACE strategy was developed by Harris, Graham, Mason, and Friedlander (2011) based on SRSDM to help students develop a writing plan by thinking about the details that should be in a story. This strategy was adapted by Öğülmüş (2018) to be used in Turkey. It was implemented to the participating students (as an independent variable) through the teaching sessions applied by the classroom teachers who were working in the resource room.

2.2. Participants

Participants consisted of three students with SLD and three classroom teachers working in the resource room.

Participating teachers: Three classroom teachers were included in the study. The teachers also work in the resource room. All three teachers were male. The professional experience of all teachers is between 5-10 years. Teachers were included in the study voluntarily. The study' purpose and how it would be carried out were explained to the participants beforehand. It was stated that the POW + C-SPACE training, which would be carried out *with online education*, will be carried out at suitable times for both themselves and the researcher. It was also explained that they had to send the application results to the researcher *remotely via internet channels*. During study reporting, teachers and families of the students were told that code names would be used for the students.

Participating Students: Participating students were asked to have the following conditions when enrolled in the study: (a) being diagnosed with developmental disorders of scholastic skills from any hospital, (b) having an educational diagnosis of SLD from any Guidance Research Centers (GRS), (c) studying at primary school, (e) study in the resource room for at least three hours a week, and (f) have writing difficulties. Following these conditions, three primary school third-grade students with SLD were included in the study. All the children had the SLD educational report issued by the GRS, and all of them were nine years old. All children continue their education in rehabilitation centres affiliated to the Ministry of National Education (MoNE) in Turkey

throughout the study. Code names were used for the students participating in the study to protect their identity and conduct the study anonymously.

2.3. Environment

The POW + C-SPACE training for teachers within the scope of the study was carried out online through the Zoom Meetings program. After the training, the teachers' probe, practice, and monitoring sessions were held in the resource rooms in the schools where the students attended. The application environment has been arranged following the teaching and implementation of the POW + C-SPACE strategy. All teachers applied the strategy with their students at a table suitable for the developmental characteristics of their students. In the implementation of the strategy, the teacher and the students were seated side by side. Resource rooms were arranged against the stimuli that would distract the students during the application. After the applications, teachers took photos of the stories written by their students and sent the photos to the researcher via WhatsApp.

2.4. Materials

The POW + C-SPACE training, which was organised individually with the participating teachers through distance learning, was recorded by the researcher through the Zoom Meetings program and sent to the teachers via internet channels. The video, sample stories, story rockets, graphic organisers, and application notes of the POW + C-SPACE training conducted in the study were used in this context. In the POW + C-SPACE training record, there is a simplified version of how to implement the POW + C-SPACE strategy to improve the story writing skill and how to use the materials given to the teachers by the researcher. In the application notes, there are notes that teachers should remember while performing the application and providing tips on how to carry out the application. The sample stories given to teachers while implementing the strategy are easy-to-understand stories, consisting of an average of 130-150 words, containing the basic components of a story.

2.5. General Process

Experimental Process: The training offered to teachers consists of probe (full probe and daily probe sessions), practice, and monitoring sessions. The teachers conducted all probe sessions held within the scope of the experimental process.

Probe Sessions: Two types of probe sessions were conducted in the study. These sessions are (a) full probe sessions and (b) daily probe sessions.

Full Probe Sessions: The first probe phase of the full probe sessions was carried out by the teachers before the POW + C-SPACE training were presented and the teachers' practices with their students. The first probe phase also formed baseline data. The teachers carried out the second, third, and fourth probe phases with the guidance of the researcher until at least three consecutive sessions of stable data were obtained for all students after meeting the criteria for story writing skills.

Collective probe sessions were held by the teachers in the resource room, one-on-one with their students. The teachers asked their students to write stories when they were ready. Participating students, on the other hand, wrote a story that they independently fictionalised. The stories written by the participating students were sent to the researcher via WhatsApp. The researcher, on the other hand, obtained the data of the probe stages by scoring these stories with the story rubric developed by Öğülmüş (2018).

Daily Probe Sessions: The teachers held daily probe sessions at the end of each teaching session. The teaching session includes three lessons in which the steps of the strategy are applied. After the teachers applied the POW + C-SPACE strategy with their students, they asked them to write a story. After the students wrote the story, the teachers sent a photo of the story to the researcher via WhatsApp. In the daily probe sessions, the steps followed in the full probe sessions were applied precisely. The behaviours expected from teachers during daily probe sessions are the same as in full probe sessions.

Teaching Sessions: Teaching sessions in which the POW + C-SPACE strategy was applied were held in the resource rooms where the participating teachers worked. Teaching sessions were expressed as (a) the POW + C-SPACE training sessions and (b) teaching sessions in which the POW + C-SPACE strategy was applied.

The POW + C-SPACE Strategy Training Sessions: The training sessions of the strategy were conducted remotely with each teacher through the Zoom Meetings program. The training lasted 45 minutes in three sessions. The training was done with a clear narration over the presentation by projecting a PowerPoint presentation on the program. At the end of the first session, teachers were introduced to the materials they will use while implementing the strategy. In the second session, a sample application was made for teachers to grasp the story components better. The sample application includes separating the story into its components using graphic organisers over a sample story. In the third session, teachers were asked to write stories using the main components of the story, and feedbacks were given. All the steps of this strategy training session, conducted through distance education, were recorded and shared with teachers so that they can watch it whenever they want. All the POW + C-SPACE strategy training sessions were conducted individually with the teachers. After the POW + C-SPACE strategy training sessions, the materials and the application notes prepared to be used by the teachers during the application were sent to them.

Teaching Sessions in which the Teachers implemented the POW + C-SPACE Strategy: The teachers applied teaching sessions after the POW + C-SPACE strategy training sessions were held. Each teacher used the POW + C-SPACE strategy with their student after carrying out the full probe phases and receiving the POW + C-SPACE strategy training presented by the researcher. The strategy has been simplified so that teachers can understand and apply it more easily. The strategy consists of three lessons. The first lesson includes explaining the purpose of the strategy, why it is implemented, how it will contribute to the story writing skill, memorising the components of the story (character, setting, goal, action, result, situation) to the student, and finding the memorised story components together with the practitioner through a sample story. The second lesson includes finding the story components from a sample story, writing these components in graphic organisers, and evaluating the sample stories that are read and placed in graphic organisers with story rockets. The third and last lesson includes creating a topic pool, selecting a topic from this pool, writing the story sections of the selected topic in the graphic editor, writing the story with the notes taken in the graphic editor, checking the written story and completing the missing components, and evaluating them with story rockets. All these applications were videotaped by the teachers and shared with the researcher via internet channels. Treatment fidelity was calculated by watching the teaching session videos. Teaching sessions were held three days a week and continued at least three times in a row after the criteria were met until stable data were obtained.

Monitoring Sessions: Monitoring sessions were held five weeks after teachers' teaching sessions, where the strategy was implemented. The teachers asked their students to write a story as in the full probe sessions. The stories written independently by the students were shared with the researcher via WhatsApp. The researcher scored the shared story and recorded the data.

2.6. Data Collection

Four different data were collected in the study: effectiveness, maintenance, social validity, and treatment fidelity data. The effectiveness and maintenance data were collected by scoring the stories that students wrote independently after applying the POW + C-SPACE strategy. These data were obtained after the stories were shared with the researcher.

Social validity data were collected by the social validity data collection form created by the researcher. There are open-ended questions about the work done in the form. The questions were sent to the teachers via Google Forms, and the social validity findings were presented by taking the answers on the same platform. There are no questions in the form that will identify the teachers.

Treatment fidelity data were collected only in teaching sessions. The data were obtained by watching the video recordings that the teachers took while applying the POW + C-SPACE strategy.

2.7. Data Analysis

The effectiveness and maintenance data were scored by the students' story rubric, converted into percentages, and graphically analysed. The analysis of the social validity data was carried out by descriptively analysing the answers collected from the teachers and students with a semi-structured social validity form. The formula "observed practitioner behaviour/planned practitioner behaviour x 100" was used to analyse the treatment fidelity data (Tekin-İftar & Kırcaali-İftar, 2013).

3. Findings

3.1. Treatment Fidelity Findings Regarding the Implementation of the Strategy by Teachers Using the POW + C-SPACE Strategy

The treatment fidelity data were collected and analysed to determine how reliably teachers implemented the POW + C-SPACE strategy with their students. For this purpose, the video recordings of the teaching sessions that the teachers held during the implementation phases were watched by the researcher.

Selim's teacher implemented the POW + C-SPACE strategy reliably at 100%, while Ege's teacher was at 94.87%, and Gökberk's teacher was 96.68% reliable.

3.2. Effectiveness Findings of the POW + C-SPACE Strategy on Students' Story Writing Skills

The graph of the data related to the teachers' development of story writing skills of their students with SLD by using the POW + C-SPACE strategy is shown in Figure 1 below. The line graph in Figure 1 indicates the story writing skill levels on the vertical axis and the number of sessions held on the horizontal axis. The data obtained due to the applications were examined in three different stages as polling, application, and monitoring.

While Selim's average story writing level in the first probe phase was 30.66%, it was observed that after the application of the independent variable, the story writing level reached the desired level by meeting the criteria for three sessions. He maintained this level in the same way in other probe sessions. While Ege's average story writing level was 26% in the first probe phase, it was observed that the story writing level reached the desired level by meeting the criteria for three sessions after the application of the independent variable. He maintained this level in all other probe sessions. Similarly, while the average of Gökberk's story writing level in the first probe phase was 26%, it was observed that the level of story writing reached the desired level by meeting the criteria for three sessions after the application of the independent variable. Gökberk maintained this level in all other probe sessions.
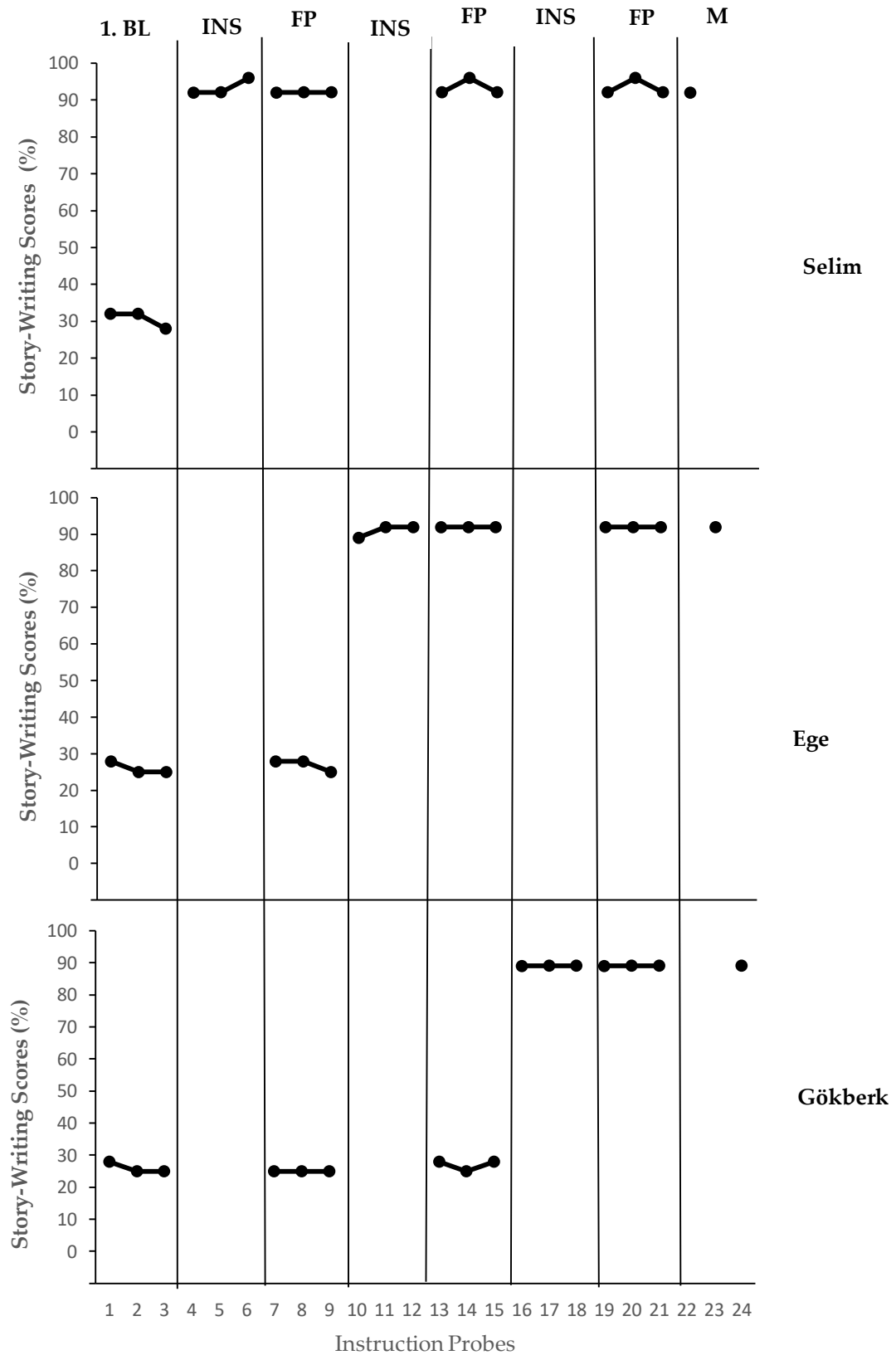
Figure 1. *The Story-Writing Scores of the Participants*

3.3. Findings Regarding Social Validity

The participant teachers and students were administered the POW + C-SPACE education social validity form to obtain the social validity findings of the study. The form consists of two parts. In the first part, participating teachers must answer five open-ended questions. In the second part of the form, there are three questions that the participant students must answer. For the children to answer easily, the questions were prepared as multiple choice. The data obtained after the form was applied were analysed with content analysis.

When the responses of the participating teachers are examined; regarding the question of what he thinks about the POW + C-SPACE Strategies Education, a teacher stated that his student, who has SLD, developed his story writing skill at a high level, and in this respect, it was a very good strategy. One teacher stated that the implementation of the strategy is very practical. It can be easily applied in the resource room and many environments. Furthermore, one teacher stated that it is a very useful strategy and should be taught to all teachers with SLD students.

Regarding the question of what the positive and negative aspects (if any) of the POW + C-SPACE strategy developed to improve the story writing skill; a teacher stated that his student with SLD knew the story components but could not organise these components; at this point, the POW + C-SPACE strategy helped his student. One teacher stated that the strategy was very useful in making his student aware of the story components. Similarly, the other teacher stated that memorising the story components was very useful in improving his student's story-writing skill.

Regarding whether they had difficulties while applying the POW + C-SPACE strategy during the study process and what they did to overcome these difficulties; two teachers stated that their students had difficulty memorising the story components but overcame this difficulty. Another teacher stated that his student had difficulty in finding the subject of the story to be written. Still, they were able to find a topic by brainstorming and following his interests.

Based on how they felt while implementing the strategy, the aspects of the strategy (if any) they like or dislike, and their different experiences (if any); a teacher stated, *"I was very happy as a teacher that my student wrote longer and more meaningful stories when I was unable to write more than two or three sentences. I realised that our students with SLD were considered unsuccessful due to the lack of appropriate teaching methods, although they actually have the capacity to do many things. Also, it is a practical and great strategy to implement in the resource room.".* The other teacher said, *"I would have a hard time finding a strategy for writing in the resource room. I don't have such a problem anymore. By using this method, we have come a long way in writing a story with my student with SLD. Thank you."*

It was observed that all teachers gave a positive opinion to the question 'would you recommend the POW + C-SPACE strategy to other teachers working with students with SLD in resource rooms?'. When the participant students were asked how they found working, it was seen that two of them stated that they liked the method, while the other student stated that they started to like writing stories. When the participant students were asked whether they would like to repeat the same application, they expressed positive opinions. Finally, when the students were asked whether they would recommend it to their friends, it was seen that all of them gave a positive opinion.

4. Conclusion, Discussion and Recommendations

The POW + C-SPACE strategy was taught to teachers working with students with SLD in the resource room. The taught strategy was applied to the students by the teachers. It was evaluated whether these practices were effective on the story writing skills of students with SLD. The resource room structure is a very suitable and efficient environment for working one-on-one with students with SLD and applying special strategies developed for them. One of the most important reasons for using the POW + C-SPACE strategy, which is shaped based on SRSDM, is that it is capable of helping students with SLD to overcome the limitations in the writing process (Öğülmüş & Melekoğlu, 2021).

Furthermore, story writing skills, one of the writing skill areas, is an important tool for students with SLD to express their feelings, thoughts, and themselves. The POW + C-SPACE strategy will greatly contribute to these students in enabling them to use this tool effectively. Thus, contributing to their current and future academic life. Therefore, the teachers and students were taught the POW + C-SPACE strategy within the scope of this

study. All these align and suggest that contextual factors can increase the quality of education (Öğülmüş et al., 2021; Tanhan & Strack, 2020). As educators, we can increase education levels by focusing on changeable factors (e.g., education methods).

The study's findings show that the POW + C-SPACE strategy applied by teachers in resource rooms increased the story-writing skill levels of children with SLD in the desired direction. The children maintained their story-writing skill levels five weeks after the application. As a result of the analysis, which evaluated the effectiveness of presenting the POW + C-SPACE strategy developed based on the SRSDM, our study is similar to previous studies (Asmara, 2016; Ballard & Glynn, 1975; Budak, 2016; Chalk, Hagan-Burke & Burke, 2005; Delano, 2007; Graham, Harris, & Mason, 2005; Özen, 2016; Rogers & Graham, 2008; Sperger, 2010; Staal, 2002, Uygun, 2012; Zumbrunn & Bruning, 2012). At the same time, this study is one-to-one compared to studies that prove the effectiveness of the strategies developed based on SRSDM in large groups and as applied in the classroom environment (Almadanı, 2013; Ballard, 1985; Demircan, 2014; Meyers, 2015; Rogers & Graham, 2008; Rumsey & Ballard, 1985). It has shown that similar results can be obtained when applied in the resource room.

Furthermore, this study parallels the results of some other studies (Al-Zoubi & Rahman, 2012; Çağlar, 2016; Kethley, 2005) on teachers' effectiveness with students with different disability types in resource rooms. As in the resource room studies mentioned, it has been observed that the teaching provided after the training was effective.

According to the data obtained from the social validity findings, the participant teachers stated that they found the POW + C-SPACE strategy very useful and were satisfied with the application. In another study, in which families applied the same strategy to their children with SLD, similar social validity findings were obtained (Almadanı, 2013; Asmara, 2016; Öğülmüş, 2018, Öğülmüş & Melekoğlu, 2021; Öğülmüş, 2021). The POW + C-SPACE strategy was found useful in different studies by different participants in different environments such as home, resource room, classes, rehabilitation centres, etc., supporting this strategy's functionality and effectiveness.

This is also the first study that enables teachers to apply a strategy based on SRSDM in the resource room. The treatment fidelity data show that teachers can apply this strategy with high treatment fidelity when the POW + C-SPACE strategy is taught through online education. The findings obtained in this direction have once again demonstrated that the POW + C-SPACE strategy is practical, effective, easy to apply, and functional. The results show that this strategy can be applied in the classroom, the resource room, or individually.

In the relevant literature, it is seen that similar studies for students with SLD and teachers working in the resource room are limited. In this context, it can be said that the current study has a quality that will contribute to the relevant literature. It is thought that this study will shed light on researchers and educators by leading to studies that include teaching other strategies based on SRSDM to teachers working in resource rooms and other educational environments. Furthermore, it may increase studies that support teachers working with students with SLD. Following are some suggestions for researchers in line with the results obtained.

- The effectiveness of the teacher education program developed based on the strategy of the POW + C-SPACE on the story writing skills of students with SLD can be examined by presenting it to other branch teachers (Turkish teacher, literature teacher, etc.).

- Other strategies developed based on SRSDM for enhancing the basic writing skills of children with SLD can be applied by the resource room teachers and examined by the researchers in the same way.

- The POW + C-SPACE strategy can be applied to students at different education levels (such as middle school) studying in the resource rooms.

- The effectiveness of the POW + C-SPACE strategy can be compared with different writing strategies.

5. References

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