International Journal of Educational Methodology
Volume 5, Issue 1, 43 - 57.
ISSN: 2469-9632
http://www.ijem.com/

Teacher Rating Scales of Early Academic Competence (TRS-EAC): Adaptation to Turkish, Validity and Reliability *

Fatma Betul Senol **
Afyon Kocatepe University, TURKEY

Figen Turan
Hacettepe University, TURKEY

Received: December 18, 2018 ▪ Revised: January 13, 2019 ▪ Accepted: January 23, 2019

Abstract: This study aims to conduct Turkish adaptation, validity and reliability studies of the Teacher Rating Scales of Early Academic Competence. This study also aims to examine and improve early academic competence thoroughly on the basis of teachers' ratings in Turkey, and lastly to contribute an assessment and measurement instrument to the literature which will enable to conduct further research in the field. This study was designed in a general survey model. The study included normally developing 619 36-72 month-old preschoolers attending to nursery classes and kindergartens affiliated to Afyonkarahisar Ministry of National Education in 2015-2016 academic year. The validity and reliability studies of the data obtained following the implementation of TRS-EAC, was completed. The Cronbach Alpha, split half test, test-retest reliability of the scale and its subscales were measured. TRS-EAC was found to be valid and reliable for 36-72 month-old children. It can be considered that the various studies that can be used TRS-EAC in Turkey will provide important contributions to the measurement power of this test.

Keywords: *Academic competence, early childhood, validity, reliability.*

To cite this article: Senol, F. B., & Turan, F. (2019). Teacher Rating Scales of Early Academic Competence (TRS-EAC): Adaptation to turkish, validity and reliability. *International Journal of Educational Methodology*, *5*(1), 43-57. doi: 10.12973/ijem.5.1.43

Introduction

With technological and scientific changes and developments in the world, expectations in education are also changing. These developments are led by globalization. Today, all these changes also influence rapid living conditions. Thus, there is a need for qualified individuals with properties such as academic success, creative and critical thinking, high-level thinking skills, and high level academic competency (Ulusoy, 2003; Charlesworth, Lind & Fleege, 2003). For qualified individuals, these individuals should be supported during early childhood period when advances in development are the highest. It is known that during pre-school period that is accepted as magical years in terms of development, academic skills can be effectively gained (Krajewski & Schneider, 2009). Additionally, pre-school educational institutions support social development of children in this period and contribute development of skills of children such as sharing, cooperating, problem solving, decision-making. Gaining all these skills supports early period academic competence gains in children (Kokko, Tremblay, Lacourse, Nagin & Vitaro, 2006; Veenstra et al., 2008).

Academic competence concept was introduced by Diperna and Elliot (1999). Based on an elementary school study of Diperna and Elliot (1999), academic competence concept should be emphasized to distinguish pre-school academic skills and other inner-class behaviours that contribute to inner-class success. Inner-class behaviours here were named as "attitudes providing academic success" and related with academic skills (Diperna & Elliot, 2004). Diperna and Elliot (1999) surveyed large scale of skills, attitudes, and behaviours that may indicate pre-school children academic skills. For academic competence field, five fundamental sections were determined by National Education Goals Panel and were considered (Kagan, Moore & Bredekamp, 1995). There fields were: (a) physical competence and motor development, (b) social and emotional development, (c) approach towards learning, (d) language development, and (e) cognitive and general knowledge accumulation (Diperna & Elliot, 1999).

In short, early childhood academic competence concept consists of combination of academic skills and gaining attitudes for academic success (DiPerna, 2004; Rimm-Kaufman, Pianta & Cox, 2000). Early academic skills include early literacy, comprehension, numeracy, creative, and critical thinking skills (DiPerna, 2004; Rimm-Kaufman, Pianta & Cox, 2000; Welsh, Nix, Blair, Bierman & Nelson, 2010). Early literacy skills include oral language skills, pronunciation, alphabet

* This research presented at IV nd International Eurasian Educational Research Congress on May 11-14, 2017.

** **Corresponding author:**
Fatma Betul Senol, Preschool Education Department, Afyon Kocatepe University, Afyon, Turkey.
✉ fatmabetulsenol@gmail.com

knowledge, phonological sensitivity, vocabulary, and writing awareness skills (Storch & Whitehurst, 2002; Mcgee & Richgels, 2008).

Early literacy skills of children are a wide range process starting from birth and acquired naturally (Ustun, 2007; Mcgee & Richgels, 2008). After early literacy skills are gained, comprehension skill is gained. Early literacy skills are gained by children in developmental sequence. Children with these skills have higher reading-writing learning motivation in formal education process (Pinto, Bigozzi, Gamannossi & Vezzani, 2009; Wildová, 2014). One of the effective skills for early literacy skills is phonological awareness. Phonological awareness means awareness of vocal units, and it is the skill to divide a word into smaller units regardless of the meaning and manipulating voices (Schnobrich, 2009). Under early literacy skills, children gain vocabulary, oral language knowledge, and pronunciation skills. Vocabulary develops with oral language skill and pronunciation skill. Children comprehend meanings of words and use these words in sentences related with their meaning. When words are learned correctly, pronunciation and oral expression skills have mutual development (Korat, 2010; Mcgee & Richgels, 2008). Alphabet knowledge skill is knowledge of how vocals are written, relationship between voices and letters, and distinguishing this relationship. Under awareness of writing, a child gains skills such as function of writing, direction of text, knowing functions on sentence, word and letter, knowing capital-small letters, and reading symbols and logos in the environment. Writing and reading skills develop simultaneously (Storch & Whitehurst, 2002; Girolametto, Weitzman & Greenberg, 2012).

Numeracy skills include comparison, counting, numerical logic, geometry, piece-whole, classification, measurement, sequencing, and prediction skills (Purpura, 2009; Kandir, Can Yasar, Yazici, Turkoglu & Yaman Baydar, 2016). As in other skills, development of numeracy skills rapidly develops during pre-school period. When numeracy skills gained in this period, it creates a foundation for mathematic learning in the following years and help children to know the world better (Linder, Powers-Costello & Stegelin, 2011; Wood & Spelke, 2005). With such numeracy skills children learn piece-whole relationship, comparison, distinguishing similarities and differences, using tables and graphics, interpreting, and problem solving (Celik, 2012). The key concept in acquisition of numeracy skills is numbers. Numeracy skill gain occurs with acquisition of three elements: number, numerical relationships, and arithmetic operations. The concept of numbers includes counting sequence information, counting principles, total number of items in a cluster, pairwise mapping; numerical relations and numeric information compare, and matching the relation of two or more entities to each other; arithmetic relations include understanding and comparing quantitative or quantitative changes, acquiring, predicting and evaluating skills such as addition and subtraction to transition to simple numeracy operations, understanding the patterns, continuing from the pattern, and creating new patterns (Jordan, Kaplan, Olah & Locuniak, 2006; Jordan, Kaplan, Ramineni & Locuniak, 2009).

Critical thinking is evaluating ideas and actions of others. Children gain critical thinking throughout their lives. Children will learn not to except all information as it is with their own experience, learn to interpret, evaluate, and constantly develop different perspectives (Heyman, 2008). Since development of critical thinking skills influence reading, reading comprehension, commenting, and numeracy skills, and these skills start to develop in early childhood period, these are included under early childhood academic skills. Since creative thinking skills influence academic success in addition to critical thinking, creative thinking has an important role under academic skills. Creative thinking like critical thinking increases as the interaction of children with the environment increases. Thus, early childhood period is critical for development of creative thinking. Creative thinking is creating new and authentic ideas by using information obtained via observation and experiences. An individual who can think creatively can filter when s/he faces a knowledge with large perspective, organize these information, and create new information due to cognitive flexibility (Gelman & Gottfried, 2006, as cited in Can Yasar, 2008; Ustundag, 2003).

Under attitude providing early academic success, Diperna and Elliot (1999) investigated approaches towards learning, social and emotional competence, fine motor skills, gross motor skills, and communication skills. Attitude towards learning leads higher academic success expectations and goals in children and influences value for education which is attitude towards academic elements and performance (Wang & Eccles, 2013). It is stated that within positive attitude, children have higher motivation to participate events (Katz & Assor, 2006). Social-emotional competence and communication skills investigates interpersonal relationships and has a positive effect on attitude towards academic success. Wentzel (2003) stated that children with higher level of interpersonal relationship and communication have positive and higher level of social emotional behaviours. Wang and Eccles (2013) indicated that there is a relationship between social emotional competence, communication skills, and attitude towards academic success of children. Motor skills are internal processes related with moving whole or portion of a body. However, motor skills include cognitive skills that generates these movements rather than only movements (Cameron, Cottone, Murrah & Grissmer, 2016). These processes include gross motor skills and movement of large muscles include body coordination, balance, and posture. These all influence attitude towards academic success (Burton & Rodgerson, 2001). Fine motor skills include movement of small muscles and skills such as writing, talking, painting, and reading (Cameron et al., 2012). As all these skills have an important effect on gaining academic skills, it has positive effect on attitude towards academic success.

As stated above, when literature was reviewed, to develop attitudes of academic success and skills of children, academic competence of children should be managed and evaluated with various measurements tools starting from pre-school period. When related scales was reviewed, under academic success, it was shown that there were

measurement tools for ability to measure different skills, language development (Katz, Onen, Demir, Uzlukaya & Uludag, 1974; Ege, Acarlar & Guleryuz, 1998; Sucuoglu, Buyukozturk & Unsal, 2008), mathematics development (Aslan, 2004; Celik & Kandir, 2011), literacy skills (Yazici, 2010; Turan & Akoglu, 2011; Karaman, 2013; Kargin, Ergul, Buyukozturk & Guldenoglu, 2015), academic and linguistic skills (Uyanik & Kandir, 2014), learning approaches (McWayne et al., 2004), social competences (McKee-Agostin & Bain, 1997), emotional competence (Howse, Calkins, Anastopoulos, Keane & Shelton, 2003), and self-control (Normandeau & Guay, 1998) of children.

When these scales were examined, measurement tools that measure different sub-skills of academic competence of children, it is striking that there was a lack of holistic measurement tool that analyze academic success of children with teacher evaluation. Besides, when the academic competence of children was evaluated by using experience and knowledge gained by children after spending a long time in their classes, it was believed that teachers could make a reliable evaluation to determine strong and weak sides of children and report these sides (Reid, Diperna, Missal & Volpe, 2014). In addition to all these information, development is a whole, and it is important to evaluate development of children by teachers that know the complete process (MEB, 2013; Reid, Diperna, Missal & Volpe, 2014). The literature review by Hoge and Coladarci (1989) indicted that there was a strong relationship between teachers' views towards academic success of children and direct measurement.

One of the measurement tools that analyses academic success of children with teacher evaluation is "Teacher Rating Scales of Early Academic Competence (TRS-EAC)" developed by Reid, Diperna, Missal and Volpe (2014). This scale is an important measurement tool to evaluate academic competence of children and identify their weaknesses. When literature was reviewed, TRS-EAC had ease of use and high level of reliability and validity values. Based on these information, to be able to holistically evaluate academic skills of pre-school children and support these skills, it was believed that measuring early academic skills with reliable and valid measurement tool is important. Due to universal development, technological advancement under current conditions, and high intercultural interactions, it can be stated that it is possible to use one measurement tool developed for a society can be used on other societies. Therefore, the purpose of this study is to perform reliability and validity of Turkish adaptation of TRS-EAC developed by Reid, Diperna, Missal and Volpe (2014). Additionally, it was aimed to include a measurement tool into literature that will enable holistic investigation and development of early childhood academic skills in Turkey evaluated by teachers.

Method

Research Design

This study was conducted in order to adapt the TRS-EAC form to Turkish children, which was developed to evaluate the early academic skills of 36-72 month old children, and it is a general survey model. The general survey model is a screening procedure which is conducted on the whole population or the group, sample to be taken from the population in order to pass a general judgment about the population consisting of a large number of elements (Karasar, 2007).

Population and Sample

The population of this study consisted of 2942 children, aged between three and six years old who were attending to nursery classes and kindergartens affiliated to Afyonkarahisar Ministry of National Education in 2015-2016 academic year. Related items in the scale were evaluated with five-scale Likert type based on "significantly below age, below age, compliant with age, above age, significantly above age". Thus, expression of related behaviours was evaluated based on the age of the children, and as age difference between children will have no effect on analyses, probability sampling method was omitted.

Non-probability (Haphazard) sampling was adopted for sampling in the population of this study. Haphazard sampling method is selection of sample based on sample size of any part of the population (Arli & Nazik, 2001). While statistical calculations of children included in the sample were conducted, 95% margin of error, 99% confidence level and 50% response distribution was used and calculated as 542. Based on calculated sample number in this study, 619 children were included. To measure test-retest reliability, total of 93 children (60 were five year old, 17 were 4 year old, 16 were 3 year old) were re-tested in a kindergarten's four classes one month later.

Out of the children in the study group, 305 (49.3%) were girls and 314 (50.7%) were boys; 88(14.2%) were between 36 and 48 months, 158 (25.5%) were between 48 and 60 months, and 373 (60.2%) were between 60 and 72 months; and it was determined that 243 (39.3%) received pre-school education and 376 (60.7%) did not.

Data Collecting Tool

General Information Form and TRS-EAC was used to collect data in the research.

General Information Form

In the research, a general information form was developed by the researcher with the purpose of collecting personal information about children, including three questions about the date of birth, gender, and whether or not received pre-

school education. General information forms have been filled in by the researcher for each child depending on the information in the child's personal development files at their schools.

Teacher Rating Scale of Early Academic Competence-Teacher Form (TRS-EAC)

Reid, Diperna, Missall and Volpe (2014) developed TRS-EAC by conducting the reliability and validity study in which the form was filled for 440 children by the 60 teachers in official pre-school institutions in USA where Head Start Program was applied. As a result of the reliability and validity tests, it was emphasized that the reliability of the Early Academic Skill Scale and the Early Academic Enablers Scale was found to be .98, which is valid and reliable at a high level. The scale consists of 81 items. TRS-EAC is developed to measure the early academic qualities of 38-70 month old children and consists of a combination of Early Academic Skills Scale (35 items) and Early Academic Enablers Scale (46 items). Early Academic Skill Scale includes "Creative Thinking, Critical Thinking Skills, Numeracy, Early Literacy, Comprehension"; Early Academic Enablers Scale consists of "Approaches to Learning, Social and Emotional Competence, Fine Motor Skills, Gross Motor Skills and Communication" subscales. Every statement about the academic competence in the scale is scored with five-point Likert scale such as significantly below age expectations (1), below age expectations (2), compatible with age expectations (3), above age expectations (4), significantly above age expectations (5). From Early Academic Skill Scale participants had the lowest score of 35 and the highest score of 175; from Early Academic Enablers Scale participants had the lowest score of 46 and the highest score of 230 (Reid, Diperna, Missall & Volpe, 2014).

Procedure

First of all, the permission of Erin E. Reid, one of the researchers who developed scale, was obtained to make the adaptation work of the TRS-EAC. The native language of the form is English. The English form is translated into Turkish by two expert linguist academics who speak English and Turkish fluently. Then the scale has been converted into one form. The created Turkish form has been translated back into English by another linguist. After the back translation, it has seen that Turkish form of the scale was close to the English form. Then, by preparing a translation expert evaluation form, English and Turkish forms of the scale were sent to five academicians who are at least at the doctorate level to obtain expert opinions on whether the scale items conformed to Turkish. In line with the opinions and suggestions received from experts, the scale was given the final shape.

Gathering the Data

Before the study, parents were informed, and their permissions were obtained. Data was collected through teachers. Teachers had filled the TRS-EAC for each child. Data was collected at Afyonkarahisar province center in April of 2015-2016 academic year. TRS-EAC was applied to 50 children by the teacher in 3 different schools in order to determine accurate measurement rate of the intended behaviors. Then, TRS-EAC was implemented by teachers for 619 children 36-72 months of age who were studying at kindergartens and pre-schools of the Ministry of National Education in Afyonkarahisar province center during the spring of 2015-2016 academic year in order to adapt them to Turkish. 35 teachers filled the TRS-EAC for 619 children. The teachers were given the scales at the beginning of April and they were asked to fill it within two weeks, and the forms were collected two weeks later. Thus, all data was collected in two weeks. Completion time ranged from 10 to 20 minutes for each child.

Data Analyses

The data were analyzed by using the SPSS 16 packet program. The distribution of demographic information was calculated as frequency and percentage values. First and second-level confirmatory factor analysis (CFA) were used to confirm whether the design of the total 81-item scale was validated or not. The aim of second-level factor analysis is to determine whether the intended superstructure has been verified. In other words, it was examined to determine whether one total score could be obtained from the scale. CFA aims to assess the extent of compliance of real data with factorial model which is composed of many observable variables (latent variables). The investigated model could define a construct which was defined by using the data of an empirical study or constructed based on a certain foundation (Sumer, 2000). CFA was conducted to examine whether the factor structure is valid.

Chi-Square Goodness Test (Chi-Square Goodness, $\chi 2$) was used in order to assess the validity of the model in confirmatory factor analysis (Cole, 1987; Sumer, 2000). Although there was no consensus on which fit indices were appropriate for the evaluation of the model, it was recommended to use more than one fit index. The most commonly used was Chi-Square Goodness Test (Chi-Square Goodness, $\chi 2$).

In order to determine the reliability of the scale, Cronbach Alpha internal consistency coefficient, split half test, and test-re-test was calculated for sub-dimensions of the two scales and also for both scales-wide. Cronbach Alpha internal consistency coefficient is an internal consistency estimation method that is appropriate to use when the items are scored as 1-3, 1-4, 1-5 when they are not scored correctly or incorrectly. The split half test was used because of the correlation between the scores of the subjects and the reliability estimate. For split half test, sub-dimensions of scale and all of the items were divided into two identical halves as single-double. Test-re-test was used because the correlation coefficient obtained from two applications was the coefficient of reliability of the scale. The item total

correlation explains the relationship between the scores of the children in the study group and the total score of the measurement tool.

Every statement about the academic competence in the scale was scored with five-point Likert scale as significantly below age expectations (1), below age expectations (2), compatible with age expectations (3), above age expectations (4), significantly above age expectations (5). From Early Academic Skill Scale participants had the lowest score of 35 and the highest score of 175, and from Early Academic Enablers Scale participants had the lowest score of 46 and the highest score of 230 (Reid, Diperna, Missall & Volpe, 2014).

Results

Content Validity

The original form of scale has remained true while adapting English version of TRS-EAC been carried out as follows:

First Stage

In the adaptation process of TRS-EAC to Turkish, the test items were firstly translated into Turkish by two English linguist academicians in line with translation-back translation technique, and the scale was translated to Turkish by linguists was converted into one form. The created Turkish form has been translated back into English by another linguist. After the back translation, it was seen that the Turkish Form of the scale was similar to the English form. The scale translated into Turkish has been put into final form was given by an expert Turkish linguist after final examination in terms of sentence structure and clarity of expressions.

Second Stage

Expert opinion has been taken to determine whether the scale items measure the intended content, and to determine whether it is applicable to Turkish. The original form of the test and its Turkish translation were presented to five academicians (expert in preschool education, has at least doctoral level) for their views regarding the validity of the TRS-EAC and the eligibility of Turkish culture. The experts were asked to examine the items on the TRS-EAC form in terms of the research relevantness and clarity, and submit their opinions on the items which the amendment, correction and removal of the materials where they seemed necessary. In addition, in order to ensure that validation-reliability study produce success at the desired level, they were asked to evaluate the test items in terms of the convenience to Turkish culture, in accordance with the triple Likert-type evaluation criteria as "Eligible", "Not Eligible" and "Modifiable".

Third Stage

In order to determine the validity of the TRS-EAC, the content validity ratio (CVR) for each item was calculated in the evaluation of five expert opinions. Then, the content validity index (CVI) was determined by taking the averages of the calculated CVRs. This index was used for the determination of whether each item was considered necessary by experts (Yurdugul, 2005). This value was calculated for the compliance level of the items. Since the number of experts was five, it was concluded that items with CVR value greater than 0.59 are thought to provide the coverage validity (Yurdugul, 2005). It has been decided that all items should remain in the scale as a result of positive opinion of all experts about the items. CVR and CVI values were obtained as 1.

Fourth Stage

The pre-application of TRS-EAC, which was finalized in line with the opinions and recommendations of the experts, was realized by applying it to 50 children in three different schools in order to determine the correct measurement of the intended behavior and skills. As a result of pre-application, the analyses result of TRS-EAC were examined, and it was determined that the reliability coefficient and total item correlations were sufficient for the whole test. Following the pre-application, scale-related adjustments were made and the scale was made ready of reliability study and it was applied to the sample which was formed from 619 children ranging in age from 36 to 72 months attending the preschools.

Structure Validity and Reliability

Confirmatory factor analysis was conducted in an attempt to present the validity of the factor structure while adapting the TRS-EAC to Turkish. In this direction, a separate confirmatory factor analysis was applied to the "Early Academic Skills Scale" and the "Early Academic Enablers Scale" which constitute the scale in order to evaluate the structural validity of the scale in the research.

First and second-level confirmatory factor analysis (CFA) was used to confirm whether the design of the total was validated or not. The aim of second-level factor analysis was to determine whether the intended superstructure has been verified. In other words, it was examined to determine whether one total score could be obtained from the scale. CFA aims to assess the extent of compliance of real data with factorial model which is composed of many observable variables (latent variables). The investigated model can define a construct which was defined by using the data of an

empirical study or constructed based on a certain foundation (Sumer, 2000). CFA was conducted to examine whether the factor structure was valid.

Although there was no consensus on which fit indices were appropriate for the evaluation of the model, it was recommended to use more than one fit index. The most commonly used were (Cole, 1987; Sumer, 2000); Chi-Square Goodness of Fit Test (Chi-Square Goodness, χ^2), Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), Non-Normed Fit Index (NNFI), Normed Fit Index (NFI), Goodness of Fit Index, (GFI). The fact that values observed in the scale model were within X2/d<3; 0<RMSEA<0.05; 0.97≤NNFI≤1; 0.97≤CFI≤1; 0.95≤GFI≤1 and 0.95≤NFI≤1 indicated the perfect fit; 4 <X2 / d <5 and 0.90 ≤ NFI≤0.95 indicated acceptable fit (Kline, 2005; Sumer, 2000).

Early Academic Skills Scale

CFA was applied to assess whether the 5 factors and the 35-item structure of the scale were verified. In the first CFA application, items with a statistically insignificant t value were examined.

When path diagram was examined, all the factors and items were preserved in the scale since none insignificant t value was found in the conducted examination. The fit indexes were χ^2=2609.68, X^2/sd= 3.95, RMSEA= 0.074, CFI=0.98, NNFI=0.98, NFI=0.97 and IFI=0.98. When the coefficients showing the relationship between the observed variables model showing the factorial structure of the scale and its factors were examined, it was concluded that all the coefficients were high. When the compliance statistics calculated with CFA considered, it has been decided that the previously determined five-factor structure of the scale yield with collected data in general.

The regression values and t-values of the items are given in Table 1.

Table 1. Regression and t Values of the CFA

Items	Regression Values	t Values	Items	Regression Values	t Values
i1	0,64	24,87	i20	0,62	32,33
i2	0,65	25,88	i21	0,64	31,16
i3	0,68	30,00	i22	0,60	31,19
i4	0,68	30,68	i23	0,69	29,77
i5	0,72	32,54	i24	0,71	30,67
i6	0,69	30,03	i25	0,63	28,60
i7	0,71	31,17	i26	0,64	31,89
i8	0,67	27,73	i27	0,64	31,92
i9	0,68	36,12	i28	0,64	32,52
i10	0,78	40,43	i29	0,62	32,04
i11	0,78	39,69	i30	0,59	29,61
i12	0,75	40,31	i31	0,72	30,97
i13	0,70	38,73	i32	0,74	32,19
i14	0,65	33,96	i33	0,73	31,02
i15	0,69	33,62	i34	0,73	32,66
i16	0,68	30,68	i35	0,73	31,18
i17	0,65	34,02			
i18	0,64	34,06			
i19	0,67	33,16			

When Table 2 was examined, it was determined that the obtained regression coefficients, and t values were significant (t> 1.92), and that the model was validated.

Second-level confirmatory factor analysis was performed to show that 5 factors of scale were representative of the superstructure. This examined model was based on the relationships between latent variables obtained in first level confirmatory factor analysis. The analysis also revealed the variances explained by the first level variables of the upper level (second level) variables.

The factor loads (Lambda x, λx), t values, measurement errors (delta δ) between the first level latent variables and the upper level (second level) variables of the model and the explanatory ratios (R^2) of the second level variable at the first level variables were presented in Table 2:

Table 2. λx, Δ coefficient (measurement error), t and R^2 values for Second Level CFA

Second Level Variable	First Level Variable	λx	δ	t	R^2
Early Academic Skills	Creative Thinking	0,89	0,20	22,68	0,80
	Critical Thinking	0,89	0,21	24,19	0,79
	Numeracy	0,97	0,07	26,40	0,93
	Early Literacy	0,96	0,08	26,09	0,92
	Comprehension	0,72	0,48	18,30	0,52

When the path coefficients and t values between the second level latent variable and first level latent variable were examined, it was found that the relations between the upper latent variable and all the factors were positive and significant ($p<0.05$). When the variances explained in the first-level variables by the second-level variables were examined, it was determined that the numeracy susceptibility dimension explained the top level at the highest level.

To calculate reliability of Early Academic Skills Scale, split half test, test-re-test, and Cronbach alpha reliability were calculated.

For split half test, sub-dimensions of scale and all items were divided into two identical halves as single-double (Table 4).

Table 3. Spearman Brown Split Half Test Reliability Results

Early Academic Skills	Spearman Brown	Split Half Correlation	Part1-Part2 Alfa
Creative Thinking	0,969	0,94	0,941-0,922
Critical Thinking	0,975	0,95	0,935-0,937
Numeracy	0,976	0,953	0,942-0,944
Early Literacy	0,945	0,896	0,856-0,911
Comprehension	0,962	0,926	0,911-0,942
Total	0,991	0,982	0,970-0,972

When Table 4 was investigated, the Split Half Correlation value of the "Creative Thinking" sub-dimension was 0.94; the Split Half Correlation value of the "Critical Thinking" sub-dimension was 0.95; the Split Half Correlation value of the "Numeracy" sub-dimension was 0.953; the Split Half Correlation value of the "Early Literacy" sub-dimension was 0.896; the Split Half Correlation value of the "Comprehension" sub-dimension was set to 0.926. The Split Half Correlation value for all of the scale was 0.982. Based on all sub-dimensions of scale and total split half test reliability results, the results were statistically reliable.

Test-retest reliability that indicated level of stability for time-based repetitive measurements was calculated for all sub-dimensions of the scale.

Table 4. Test-reTest Reliability Correlation Results

Early Academic Skills	Creative Thinking 1	Critical Thinking 1	Numeracy 1	Early Literacy 1	Comprehension 1	Total 1
Creative Thinking 2	0,994					
Critical Thinking 2		1				
Numeracy 2			0,999			
Early Literacy 2				0,997		
Comprehension 2					0,998	
Total 2						0,999

When Table 4 was investigated, for all sum-dimension and all scale, applied repetitive measurements indicated high level of correlation and test re-test reliability was achieved.

To calculate internal consistency coefficient of Early Academic Skills Scale Cronbach alpha reliability were calculated. The internal consistency coefficient Cronbach alpha was calculated for the reliability of the scale. The alpha value of the "Creative Thinking" sub-dimension was 0.97; the alpha value of the "Critical Thinking" sub-dimension was 0.97; the alpha value of the "Numeracy" susceptibility sub-dimension was 0.96; the alpha value of the "Early Literacy" sub-dimension was 0.97; the alpha value of the "Comprehension" sub-dimension was set to 0.94. The alpha value for all of the scale was 0.985.

Table 5. Item Analysis Results

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
i1	116,496	531,617	,782	,985	**i20**	116,381	532,028	,835	,985
i2	116,451	531,089	,771	,985	**i21**	116,470	530,698	,847	,985
i3	116,491	530,533	,811	,985	**i22**	116,491	533,143	,820	,985
i4	116,467	530,457	,831	,985	**i23**	116,501	528,371	,824	,985
i5	116,470	529,314	,835	,985	**i24**	116,517	527,559	,840	,985
i6	116,452	530,842	,801	,985	**i25**	116,545	530,664	,818	,985
i7	116,436	529,366	,826	,985	**i26**	116,335	530,934	,844	,985
i8	116,352	530,589	,790	,985	**i27**	116,476	530,542	,858	,985
i9	116,241	530,242	,824	,985	**i28**	116,386	531,056	,842	,985
i10	116,259	528,598	,837	,985	**i29**	116,483	532,370	,830	,985
i11	116,303	528,260	,808	,985	**i30**	116,468	533,704	,801	,985
i12	116,272	528,838	,831	,985	**i31**	116,767	533,406	,668	,985
i13	116,301	529,971	,841	,985	**i32**	116,695	532,521	,700	,985
i14	116,344	531,012	,832	,985	**i33**	116,799	534,229	,647	,986
i15	116,306	529,346	,846	,985	**i34**	116,710	533,086	,699	,985
i16	116,434	528,860	,840	,985	**i35**	116,757	533,804	,662	,985
i17	116,335	531,210	,841	,985					
i18	116,339	531,786	,838	,985					
i19	116,379	529,992	,846	,985					

When Table 5 examined according to Early Academic Skills Scale's evaluation criteria, the total item correlations were at a sufficient level.

Table 6. Average Scores of Children from the Early Academic Skills Scale

Early Academic Skills	Mean±sd	Min.	Max.
Creative Thinking	25,30±5,55	8,00	40,00
Critical Thinking	31,46±6,51	10,00	50,00
Numeracy	16,69±3,73	5,00	25,00
Early Literacy	14,34±3,77	5,00	25,00
Comprehension	22,77±4,68	7,00	35,00
Total	110,56±21,83	35,00	175,00

The Table 6 shows average scores of children from the Early Academic Skills scale. It can be seen that the general average scale score of children was 110,56, the average scale score for Creative Thinking sub-dimension was 25,30, the average scale score for Critical Thinking sub-dimension was 38,21, the average scale score for Numeracy sub-dimension was 16,26, the average scale score for Early Literacy sub-dimension was 14,34, and the average scale score for Comprehension sub-dimension was 35,82.

Early Academic Enablers Scale

The CFA was applied to assess whether the scale, which has a 5-factor and a 46-item structure was true or not. In the first CFA applied, substances with a statistically insignificant t value were examined.

When path diagram was examined, all the factors and materials were preserved in the scale since no t value was found which was not meaningful in the examination made. The fit indexes were $\chi 2 = 4421.86$, X2 / sd = 4.29, RMSEA = 0.077, CFI = 0.98, NNFI = 0.98, NFI = 0.98 and IFI = 0.98. When the coefficients of the relationship between observed factors and variables of the model showing factorial structure of the scale were examined, it was concluded that all the coefficients were high. Given the compliance statistics calculated with CFA, it has been decided that the aggregate yield generally complements the previously determined five-factor structure.

Table 7 shows the regression values and t values of the items.

Table 7. Regression and t Values of the CFA

Items	Regression Values	t Values	Items	Regression Values	t Values
i36	0,66	27,96	i60	0,60	26,15
i37	0,75	30,45	i61	0,60	28,80
i38	0,75	30,42	i62	0,61	27,51
i39	0,72	31,43	i63	0,60	27,99
i40	0,70	30,49	i64	0,60	22,69
i41	0,72	30,53	i65	0,63	27,34
i42	0,65	27,72	i66	0,62	24,87
i43	0,69	29,48	i67	0,51	25,57
i44	0,70	29,81	i68	0,54	28,30
i45	0,70	29,72	i69	0,66	30,05
i46	0,52	16,13	i70	0,65	32,14
i47	0,71	24,05	i71	0,66	29,67
i48	0,62	19,24	i72	0,65	31,93
i49	0,71	25,64	i73	0,66	30,62
i50	0,72	24,72	i74	0,65	28,63
i51	0,73	25,07	i75	0,54	28,95
i52	0,60	27,85	i76	0,59	28,38
i53	0,64	26,68	i77	0,57	27,18
i54	0,65	24,89	i78	0,61	28,96
i55	0,59	27,26	i79	0,73	66,19
i56	0,60	27,74	i80	0,75	85,62
i57	0,64	28,14	i81	0,73	64,94
i58	0,63	27,68			
i59	0,63	26,96			

When Table 7 was examined, it was determined that the obtained regression coefficients ,and t values were significant (t>1.92) and that the model was confirmed.

Second-level confirmatory factor analysis was performed to show that 5 factors of scale were representative of the superstructure. The basis for this model was the relationships between latent variables obtained in first level confirmatory factor analysis. The analysis also revealed the variances explained by the first level variables of the upper level (second level) variables.

The factor loads (Lambda x, λx), t values, measurement errors (delta δ) between the first level latent variables in the model and the upper level (second level) variable and the explanatory ratios (R^2) of the second level variable in the first level variables were presented in Table 8:

Table 8. λx, δ (measurement error), t and R^2 values towards the Second Level CFA

Second Level Variable	First Level Variable	λx	δ	t	R^2
Early Academic Enablers Scale	Approaches to Learning	0,93	0,14	23,89	0,86
	Social–Emotional Competence	0,88	0,22	19,61	0,78
	Fine Motor Skills	0,97	0,07	23,31	0,93
	Gross Motor Skills	0,95	0,10	24,38	0,90
	Communication	0,79	0,37	22,99	0,63

When the path coefficients and t values between the second level latent variable and the first level latent variable were examined, it was found that the relations between the upper latent variable and all the factors were positively significant (p <0.05). When the variances explained in the first-level variables by the second-level variables were examined, it was determined that the fine motor size explains the superstructure at the highest level.

To calculate reliability of Early Academic Enablers Scale**,** split half test, test-retest, and Cronbach alpha reliability were calculated.

For split half test, sub-dimensions of scale and all items were divided into two identical halves as single-double (Table 9).

Table 9. Spearman Brown Split Half Test Reliability Results

Early Academic Enablers Scale	Spearman Brown	Split Half Correlation	Part1-Part2 Alfa
Approaches to Learning	0,984	0,969	0,949-0,956
Social–Emotional Competence	0,978	0,958	0,957-0,952
Fine Motor Skills	0,95	0,905	0,880-0,944
Gross Motor Skills	0,981	0,963	1-0,966
Communication	0,983	0,966	0,948-0,936
Total	0,995	0,99	0,980-0,980

When Table 9 was investigated, the Split Half Correlation value of the "Approaches to Learning" sub-dimension was indicated at 0.969, "Social–Emotional Competence" sub-dimension was 0.958, "Fine Motor Skills" sub-dimension was 0.905, "Gross Motor Skills" sub-dimension was 0.963, and "Communication" sub-dimension was 0.966. The Split Half Correlation value for all the whole scale was 0.99. Based on all sub-dimensions of scale and total split half test reliability results, the results were statistically reliable.

Test-retest reliability that indicated level of stability for time-based repetitive measurements was calculated for all sub-dimensions of the scale (Table 10).

Table 10. Test-reTest Reliability Correlation Results

Early Academic Enablers Scale	Approaches to Learning	Social–Emotional Competence	Fine Motor Skills	Gross Motor Skills	Communication	Total
Approaches to Learning	1					
Social–Emotional Competence		1				
Fine Motor Skills			1			
Gross Motor Skills				0,996		
Communication					1	
Total						1

When Table 10 was investigated, for all of the sum-dimensions and all the scale, applied repetitive measurements indicated high level of correlation and test-retest reliability was achieved.

To calculate internal consistency coefficient of Early Academic Skills Scale Cronbach alpha reliability were calculated. The internal consistency coefficient Cronbach alpha was calculated for determining the reliability of the scale. The alpha value of the "Approaches to Learning" sub-dimension was indicated at 0.97, the alpha value of the "Social–Emotional Competence" sub-dimension was 0.97, the alpha value of the "Fine Motor Skills" sub-dimension was 0.98, the alpha value of the "Gross Motor Skills" sub-dimension was 0.98, and the alpha value of the "Communication" sub-dimension was 0.98. The alpha value for all the whole scale was 0.99.

Tablo 11. Item Analysis Results

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
i36	147,60	802,231	,773	,990	**i60**	147,64	803,862	,879	,990
i37	147,55	797,425	,819	,990	**i61**	147,67	803,543	,852	,990
i38	147,54	797,013	,816	,990	**i62**	147,65	803,873	,867	,990
i39	147,58	798,351	,837	,990	**i63**	147,72	803,274	,823	,990
i40	147,59	798,847	,840	,990	**i64**	147,77	802,618	,792	,990
i41	147,51	798,556	,830	,990	**i65**	147,79	802,152	,771	,990
i42	147,63	800,203	,825	,990	**i66**	147,84	804,210	,711	,990
i43	147,59	799,647	,823	,990	**i67**	147,66	800,921	,834	,990
i44	147,64	798,447	,838	,990	**i68**	147,68	801,117	,841	,990
i45	147,60	798,825	,836	,990	**i69**	147,64	801,060	,881	,990
i46	147,53	800,481	,787	,990	**i70**	147,67	800,573	,847	,990
i47	147,75	801,881	,720	,990	**i71**	147,67	801,541	,864	,990

Table 11. Continued

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
i48	147,54	801,026	,827	,990	**i72**	147,71	800,516	,854	,990
i49	147,57	800,392	,798	,990	**i73**	147,80	807,186	,770	,990
i50	147,55	800,544	,796	,990	**i74**	147,70	804,012	,843	,990
i51	147,55	800,768	,837	,990	**i75**	147,65	803,881	,864	,990
i52	147,62	799,972	,869	,990	**i76**	147,71	803,108	,802	,990
i53	147,74	800,447	,813	,990	**i77**	147,66	803,912	,851	,990
i54	147,64	804,116	,852	,990	**i78**	147,65	805,037	,876	,990
i55	147,61	803,987	,854	,990	**I79**	147,49	803,775	,770	,990
i56	147,59	801,646	,867	,990	**I80**	147,50	801,941	,788	,990
i57	147,63	802,321	,850	,990	**I81**	147,44	802,295	,785	,990
i58	147,65	802,478	,833	,990					
i59	147,73	803,464	,827	,990					

When Table 11 was examined according to Early Academic Enablers Scale's evaluation criteria, the total item correlations were at a sufficient level.

Table 12. Average Scores of Children from the Early Academic Enablers Scale

Early Academic Enablers Scale	Mean±sd	Min.	Max.
Approaches to Learning	47,07±9,33	16,00	75,00
Social–Emotional Competence	38,21±7,50	12,00	60,00
Fine Motor Skills	16,26±3,56	5,00	25,00
Gross Motor Skills	10,12±2,23	6,00	15,00
Communication	32,60±7,14	12,00	50,00
Total	147,59±28,31	55,00	230,00

The table shows average scores of children from the Early Academic Enablers Scale. It can be seen that the general average scale score of children was 147.59; the average scale score for Approaches to Learning sub-dimension was 47.07; the average scale score for Social–Emotional Competence sub-dimension was 38.21; the average scale score for Fine Motor Skills sub-dimension was 16.26; the average scale score for Gross Motor Skills sub-dimension was 10.12; and average scale score for Communication sub-dimension was 32.60.

Discussion and Conclusion

The aim of the study was to conduct the reliability and validity work of TRS-EAC developed in the USA by adapting the scale to the Turkish children in order to gain a reliable instrument to literature that can measure the academic competencies of Turkish children as a whole. TRS-EAC has been developed by conducting the reliability and validity study in which the form was filled for 440 children by the 60 teachers in official pre-school institutions in USA where Head Start Program was applied. Dunn (2016) and Cleveland (2017) emphasized ease of use of TRS-EAC as well as high validity and reliability values.

As a result of the reliability study conducted in the United States, the Cronbach Alpha internal consistency coefficient changed from .89 to .98 (Reid, Diperna, Missal & Volpe, 2014). As a result of the reliability study conducted to adapt the scale to Turkish children, it was found that Early Academic Skills Scale's the Cronbach Alpha internal consistency coefficient changed between .94 and .98; Early Academic Enablers Scale's the Cronbach Alpha internal consistency coefficient changed between .97 and .99. According to these results, it can be said that the reliability values of the two validity reliability studies were parallel. Nunnally (1978) stated that an alpha value greater than .50 is sufficient for reliability calculations (Nunnally, 1978, as cited in Dogan 2004). Buyukozturk (2004) stated that .70 or higher reliability calculations for a measurement tool was generally sufficient for reliable test scores. Additionally, Alpar (2014) emphasized that when alpha values were between .80 and 1.00, data obtained from the corresponding measurement tools have high reliability. When the alpha internal consistency coefficient results obtained from this

study were analyzed, it was seen that the results were between .94 and .98. Based on these values, it can be said that this measurement tool has high reliability.

When Early Academic Skills Scale's Spearman Brown Split Half Test Reliability Results were analyzed, there was a Split Half Correlation value between 0.89 and 0.98 and when Early Academic Enablers Scale's Spearman Brown Split Half Test Reliability Results were analyzed, there was a Split Half Correlation value between 0.905 and 0.99. Alpar (2014) stated that scales that had correlation coefficient of 1 or close to 1 was reliable at a perfect level. Correlation values obtained from this study were between 0.89 and 0.99. Since these values were close to 1, this proves that this measurement tool has high reliability.

When Early Academic Skills Scales Test's re-test reliability results were analyzed, the test/re-test Reliability Correlation value was found to be between 0.994 and 1. When Early Academic Enablers Scale's results were analyzed, the test/re-test reliability correlation value was between 0.996 and 1. If the correlation coefficient of the test/re-test approaches +1, it can be said that the related scale is reliable and measurements show similarity (Alpar, 2014). Tavsancil (2006) expressed that to prove the time-based stability of a scale, the correlation coefficient must be positive and high in this applied method, and this should be at least .70 for scales. Since the correlation values obtained from this study were above 0.994, i.e. close to +1, this scale could be considered reliable.

Based on item analyses results for Early Academic Skills Scale's and Early Academic Enablers Scale's evaluation criteria, the total item correlations were at a sufficient level. Reid, Diperna, Missal & Volpe (2014) found the sufficient total item correlation for scales. Buyukozturk (2010) emphasized that positive and high total item correlation sampled similar behaviours in the measurement tool. Therefore, the test measurement tool has high internal consistency. Additionally, items with .30 or higher total item correlation differentiated individuals at a good level and these items should be included in the scale. Since total item correlations obtained from this study were higher than 0.647, these values showed that items differentiate individuals at a good level and these items should be kept in the scale.

It was stated that under early academic skills, early literacy skills was linked with early academic skills of children (Purpura, Schmitt and Ganley, 2017). Studies show that there was a significant relationship between numeracy skills and early literacy and with early academic skills in general (Duncan et al., 2007; Pagani, Fitzpatrick, Archambault, & Janosz, 2010). Therefore, it could be said that reliability results obtained from this study and the average scores of children supported each other. Reid, Diperna, Missal & Volpe (2014) explained creative thinking with generating new ideas while other authors explained critical thinking with reasoning and analytic skills. Accordingly, a validity and reliability study conducted by the authors showed a high reliability in creative and critical thinking sub-dimensions. This result supports the results obtained in this study.

When the fine and gross motor skills sub-dimension was analyzed under the Attitudes for Early Academic Success, it could be stated that this scale had a unique property to relate fine and gross motor skills with academic skills and measuring this relationship (Reid, Diperna, Missal & Volpe, 2014). Reid, Diperna, Missal & Volpe (2014) found high reliability results of fine and gross motors skills sub-dimensions with this measurement tool. It was stated that fine motor skills played an important role for comprehending numeracy and fingers had an important role when there were no visual materials (Noel, 2005). All these information support the high reliability obtained in the fine and gross motor skills sub-dimensions in this study and average scores of children. Social and emotional skills were collected under the same sub-dimension, and it was stated that there was a direct relationship between social-emotional competence and interaction (Senol, 2017; Reid, Diperna, Missal & Volpe; 2014). It can be stated that children with adequate social and emotional competence and high interaction should have higher attitudes towards academic success and results of this study supports this argument.

Based on this information, it could be said that the average scores of children obtained from this measurement tool support explanations given above as well as previous studies.

Results indicated that TRS-EAC was a scale prepared by considering development properties of 36-72 months children to evaluate academic competence of children and high reliability results were obtained after this scale was adopted to Turkish and applied on study group. It could be commented that TRS-EAC was a valid and reliable measurement tool to identify academic skills of children. It is believed that the scale will have significant contribution to literature in this form.

Recommendations

Although high level of reliability and validity results were obtained from TRS-EAC, there were certain limitations in this study. Recommendations related with these limitations are presented:

- TRS-EAC is only limited with normal development children in pre-school of Afyonkarahisar. To increase generalizable structure of TRS-EAC, it could be recommended that the scale needs to be applied to larger samples.
- Since compliance with age was considered to evaluate TRS-EAC scale items, probability sampling method was omitted. It could be recommended that this study could be constructed with probability sampling method and can be applied to different groups by creating properties such as age, socio-economic status etc.

- Demographical information of teachers was omitted during reliability and validity study of TRS-EAC. Based on certain demographical properties, considering that teachers may have more information regarding development of children, calculation for teacher classification based on these variables can be recommended.
- The relationship of sub-dimensions with each other can be investigated by educational interventions.

In addition to limitations of this study, the following recommendation can also be provided:

- It could be suggested that making various studies with TRS-EAC in Turkey will significantly contribute to strength of the scale. It could also be suggested that TRS-EAC could be used with other scales in special education, primary education, elementary school, speech and language therapy, psychology, guidance, and consultant, and studies that investigate effects of this scale that was used for preparing developmental intervention and education programs could be planned.

References

Alpar R. (2014). *Practical statistics and validity and reliability with examples from sports, health and educational sciences* (Renewed 3th ed). Ankara: Detay Publishing.

Arli, M., & Nazik, H. (2001). *Introduction to scientific research.* Ankara: Gazi Bookstore.

Burton, A. W., & Rodgerson, R. W. (2001). New perspectives on the assessment of movement skills and motor abilities. *Adapted Physical Activity Quarterly, 18*(4), 347–365.

Buyukozturk, S. (2010). *Data analysis handbook* (4th ed.). Ankara: Pegem Academy Publishing.

Cameron, C. E., Brock, L. L., Murrah, W. M., Bell, L. H., Worzalla, S. L., Grissmer, D. W., & Morrison, F. J. (2012). Fine motor skills and executive function both contribute to kindergarten achievement. *Child Development, 83*(4), 1229–1244.

Cameron, C. E., Cottone, E. A., Murrah, W. M., & Grissmer, D. W. (2016). How are motor skills linked to children's school performance and academic achievement? *Child Development Perspectives, 10*(2), 93–98.

Can Yasar, M. (2009). *A study on the effect of drama education on creative thinking skills of six-year-old preschool children* (Unpublished doctoral dissertation). Ankara University, Ankara, Turkey.

Charlesworth, R., Lind, K. K., & Fleege, P. (2003). *Math and science for young children (4th ed.)*. New York: Thomson-Delmar Learning.

Cleveland, L. M. (2017). *Examining the relationship between gifted behavior rating scores and student academic performance* (Unpublished doctoral dissertation). Concordia University, Portland, USA.

Cole, D. A. (1987). Utility of confirmatory factor analysis in test validation research. *Journal of Consulting and Clinical Psychology*, *55*(4), 584-594.

Celik, M. (2012). *The effect of 'big math for little kids' educational program on the mathematical development of children aged 61-72 months old* (Unpublished doctoral dissertation). Gazi University, Ankara, Turkey.

DiPerna, J. C., & Elliott, S. N. (1999). Development and validation of the academic competence evaluation scales. *Journal of Psychoeducational Assessment, 17*(3), 207 – 225.

DiPerna, J. C. (2004). Structural and concurrent validity evidence for the academic competence evaluation scales-college edition. *Journal of College Counseling*, *7*(1), 64-72.

Dogan, M. (2004). Teachers' thoughts about mathematics: comparison of Turkish and British students. *Yuzuncu Yil University Journal of Education Faculty, 1*(11), 1-14.

Dunn, A. (2016). *Social emotional development's effect on academic achievement of children with special needs* (Unpublished Certificate of Advanced Study Thesis). Sacred Heart University, Fairfield, CT.

Duncan, G. J., Dowsett, C. J., Claessens, A., Magnuson, K., Huston, A. C., Klebanov, P., . . ., & Japel, C. (2007). School readiness and later achievement. *Developmental Psychology, 44*(1), 1428-1446.

Ege, P., Acarlar, F., & Guleryuz, F (1998). The relationship between age and mean verbal length in Turkish acquisition. *Turk Psikoloji Dergisi, 13*(41), 19-33.

Girolametto, L., Weitzman, E., & Greenberg, J. (2012). Facilitating emergent literacy: Efficacy of a model that partners speechlanguage pathologists and educators. *American Journal of Speech-Language Pathology, 21*(1), 47–63.

Heyman, G. D. (2008). Children's critical thinking when learning from others. *Current Directions in Psychological Science*, *17*(5), 344-347.

Hoge, R. D., & Coladarci, T. (1989). Teacher-based judgments of academic achievement: A review of literature. *Review of Educational Research, 59*(3), 297 – 313.

Howse, R. B., Calkins, S. D., Anastopoulos, A. D., Keane, S. P., & Shelton, T. L. (2003). Regulatory contributors to children's kindergarten achievement. *Early Education and Development, 14*, 101-119.

Jordan, N. C., Kaplan, D., Olah, L. N., & Locuniak, M. N. (2006). Number sense growth in kindergarten: A longitudinal investigation of children at risk for mathematics difficulties. *Child Development, 77*(1), 153–175.

Jordan, N. C., Kaplan, D., Ramineni, C., & Locuniak, M. N. (2009). Early math matters: Kindergarten number competence and later mathematics outcomes. *Developmental Psychology, 45*(3), 850–867.

Kandir, A. Can Yasar, M., Yazici, E., Turkoglu, D. & Yaman Baydar, I. (2016). *Mathematics in Early Childhood Education*. Istanbul: Morpa Publishing.

Karasar, N. (2007). *Scientific Research Method* (17th Ed.). Ankara: Nobel Publishing.

Katz, I., & Assor, A. (2006). When choice motivates and when it does not. *Educational Psychology Review, 19*, 429-442.

Katz, J., Onen, F., Demir, N., Uzlukaya, A., & Uludag, P. (1974). Peabody picture word test form B. *Hacettepe Bulletin of Social Sciences and Humanities, 6*(1-2), 129-140.

Kline, R. B. (2005). *Principles and practice of structural equation modeling* (3th Ed.). New York: Guilford Press.

Kokko, K., Tremblay, R. E., Lacourse, E., Nagin, D. S., & Vitaro, F. (2006). Trajectories of prosocial behavior and physical aggression in middle childhood: Links to adolescent school dropout and physical violence. *Journal of Research on Adolescence*, *16*(3), 403-428.

Korat, O. (2010). Reading electronic books as a support for vocabulary, story comprehension and word reading in kindergarten and first grade. *Computers & Education, 55*(1), 24-31.

Krajewski, K., & Schneider, W. (2009). Early development of quantity to number-word linkage as a precursor of mathematical school achievement and mathematical difficulties: Findings from a four-year longitudinal study. *Learning and Instruction, 19*(6), 513–526.

Linder, S. M., Powers-Costello, B., & Stegelin, D. A. (2011). Mathematics in early childhood: research–based rationale and practical strategies. *Early Childhood Education Journal, 39*(1), 29-37.

Mcgee, L. M., & Richgels, D. J. (2008). *Literacy's Beginnings* (5th ed.). Boston: Pearson Allyn and Bacon.

McKee-Agostin, T., & Bain, S. K. (1997). Predicting early school success with developmental and social skills screeners. *Psychology in the Schools, 34*(3), 219-228.

McWayne, C. M., Fantuzzo, J. W., & McDermott, P. A. (2004). Preschool competency in context: An investigation of the unique contribution of child competencies to early academic success. *Developmental Psychology, 40*, 633-645.

Noel, M. P. (2005). Finger gnosia: A predictor of numerical abilities in children? *Child Neuropsychology, 11*(5), 413-430.

Normandeau, S., & Guay, F. (1998). Preschool behavior and first-grade school achievement: The mediational role of cognitive self-control. *Journal of Educational Psychology, 90*, 111-121.

Pagani, L. S., Fitzpatrick, C., Archambault, I., & Janosz, M. (2010). School readiness and later achievement: A French Canadian replication and extension. *Developmental Psychology, 46*(5), 984-994.

Purpura, D. J. (2009). *Informal number-related mathematics skills: An examination of the structure of and relations between these skills in preschool* (Unpublished doctoral dissertation). Florida State University, Florida.

Purpura, J. D., Schmitt, A. S., & Ganley, M. C. (2017). Foundations of mathematics and literacy: The role of executive functioning components**.** *Journal of Experimental Child Psychology, 153,* 15-34. doi: 10.1016/j.jecp.2016.08.010

Reid, E. E., Diperna, J. C., Missal, K., & Volpe, R. J. (2014). Reliability and structural validity of the teacher rating scales of early academic competence, *Psychology in the Schools, 51*(6), 535-553.

Rimm-Kaufman, S. E., Pianta, R. C., & Cox, M. J. (2000). Teachers' judgments of problems in the transition to kindergarten. *Early Childhood Research Quarterly, 15*(2), 147-166.

Schnobrich, K. M. (2009). *The relationship between literacy readiness and auditory and visual perception in kindergarteners* (Unpublished master of thesis). Miami University, Oxford.

Storch, S. A., & Whitehurst, G. J. (2002). Oral language and code-related precursors to reading: Evidence from a longitudinal structural model. *Developmental Psychology, 38*(6), 934–947.

Sumer, N. (2000). Structural equation models: Basic concepts and sample applications. *Turk Psikoloji Yazilari, 3*(6), 49-74.

Senol, F. B. (2017). *The effectiveness of drama teaching program on interacation and social information processes at preschool classrooms applying inclusive education* (Unpublished doctoral dissertation). Hacettepe University, Ankara, Turkey, Turkey.

Tavsancil, E. (2006). *Measurement of attitudes and data analysis by SPSS* (3th ed.). Ankara: Nobel Publishing.

Ulusoy, A. (2003). Learning. A. Ulusoy (Ed.), *Development and learning* (137-148). Ankara: Ani Publishing.

Uyanik, O., & Kandir, A. (2014). Adaptation of the Kaufman Survey of Early Academic and Language Skills to Turkish Children Aged 61 to 72 Months. *Educational Sciences: Theory & Practice, 14*(2), 669-692.

Ustun, E. (2007). *Development of Literacy Skills of Preschool Children*. Istanbul: Morpa Publishing.

Ustundag, T. (2003). *Journey to creativity* (2nd Ed.). Ankara: Pegem Academy Publishing.

Veenstra, R., Lindenberg, S., Oldehinkel, A. J., De Winter, A. F., Verhulst, F. C., & Ormel, J., (2008). Prosocial and antisocial behavior in preadolescence: Teachers' and parents' perceptions of the behavior of girls and boys. *International Journal of Behavioral Development*, *32*(3), 243-251.

Wang, M. T., & Eccles, J. S. (2013). School context, achievement motivation, and academic engagement: A longitudinal study of school engagement using a multidimensional perspective. *Learning and Instruction, 28*, 12-23.

Welsh, J. A., Nix, R. L., Blair, C., Bierman, K. L., & Nelson, K. E. (2010). The development of cognitive skills and gains in academic school readiness for children from low-income families. *Journal of Educational Psychology, 102*(1), 43–53.

Wentzel, K. R. (2003). Sociometric status and adjustment in middle school: A longitudinal study. *Journal of Early Adolescence, 23*(1), 5-28.

Wildová, R. (2014). Initial reading literacy development in current primary school practice*, Procedia - Social and Behavioral Sciences, 159*(23), 334-339

Wood, J. N., & Spelke, E. S. (2005). Infants' enumeration of actions: Numerical discrimination and its signature limits. *Developmental Science, 8*(2), 173–181.

Yurdugul, H. (2005). Use of scope validity indexes for scope validity in scale development studies. *XIV. National Educational Sciences Congress*, Denizli.