Educational Policy Analysis and Strategic Research

Volume 13, Issue 2 June 2018

epasr.penpublishing.net

ISSN: 1949 -4289 (Print)

Investigation of School Readiness and Academic Development of Elementary Students Firstly Enrolled at School with '4+4+4 Education Regulation' in Turkey

Ali Ekber Sahin & Cigdem Is Guzel

To cite this article

Sahin, A.E. & Guzel, C.I. (2018). Investigation of School Readiness and Academic Development of Elementary Students Firstly Enrolled at School with '4+4+4 Education Regulation' in Turkey. Educational Policy Analysis and Strategic Research, 13(2), 104-127. doi: 10.29329/epasr.2018.143.6

Published Online	July 23, 2018
Article Views	11 single - 26 cumulative
Article Download	29 single - 45 cumulative
DOI	https://doi.org/10.29329/epasr.2018.143.6

Educational Policy Analysis and Strategic Research, V 13,N 2, 2018

Investigation of School Readiness and Academic Development of Elementary School Students Firstly Enrolled at School with "4+4+4 Education Regulation" in Turkey

Ali Ekber Şahin[i]
Hacettepe University, Ankara, Turkey
Çiğdem İş Güzel [ii]
Hacettepe University, Ankara, Turkey

Abstract

Setting the age for starting elementary students at 60 months old has been a hotly debated topic in Turkey since the Grand National Assembly passed an education reform bill as Law No. 6287, known to the public as the "4+4+4 regulation." At the outset of its implementation, students who started first grade in school year 2012–2013 had an age distribution in the range of 60 to 84 months. The present research aims to determine the effect of this age difference among students in the same grade level on their subsequent development. Thus, the study is a longitudinal and causal comparative research since comparison of the two age groups on both readiness for the school and the academic development throughout the four assessments within six months intervals was investigated. The results indicate that students younger than 69 months are disadvantaged against their older peers in all the specified fields and subfields during all the periods studied.

Keywords: *Academic development, Academic success, Age Distribution, 4+4+4 educational regulation, School readiness*

DOI: 10.29329/epasr.2018.143.6

---

[i] **Ali Ekber Şahin,** Prof. Dr., Hacettepe University, Faculty of Education, Department of Elementary Education, Division of Primary Education, Turkey.

[ii] **Çiğdem İş Güzel,** Assist**.** Prof. Dr., Hacettepe University, Faculty of Education, Department of Elementary Education, Division of Primary Education, Turkey.

Correspondence: cigdem.isguzel@hacettepe.edu.tr

Introduction

The Law on Amendment of Elementary Education and Training Law and Along with Some Other Laws (Law No. 6287), ratified in the Grand National Assembly of Turkey on March 30, 2012 and implemented after publication in the Official Gazette on April 11, 2012, has necessitated regulation in three fields in the Turkish education system. Publicly known as the "4+4+4 regulation in education" and first implemented in school year (SY) 2012–2013, this education reform (1) moved the schooling age to an earlier age; (2) separated elementary schools into elementary schools, middle schools, and Religious (Imam Hatip) middle schools; and (3) included middle school education in compulsory education. These amendments are expected to yield short, intermediate, and long-term effects on students, families, schools, and society. Thus, there is a need for systematic, ethical, and skeptical examination of these effects especially the first topic since the earlier schooling age in the reform is the most debated topic among regulations implemented.

Law No. 6287 amends article 15 of the Ministry of National Education (MONE) Elementary Institutions Regulation, published in the Official Gazette dated August 27, 2003. This clause on schooling age previously stipulated the following:

> Children who turned 72 months on December 31 of that year are enrolled in grade one of elementary schools. Children entitled to enroll due to age, but not physically sufficiently developed, may, upon written request by parents, continue pre-school education or delay enrollment by one year. (MEB İlköğretim Kurumları Yönetmeliği [MONE Elementary Institution Regulation], 2003).

The current version of this regulation, amended on July 21, 2012, reads as follows:

> Children turning 66 months by the end of September are enrolled in grade one of elementary schools. Children of age between 60 and 66 months, understood to be prepared for elementary school regarding development may also be enrolled in grade one upon request by parents. Children entitled to enroll due to age, but not physically or mentally sufficiently developed and cannot adapt to school, aged 66 months or older, may be enrolled in pre-school education or enrollment may be delayed by one year, upon a medical reports issued until end of November by medical institutions, with the diagnosis stating physical or mental underdevelopment. (MEB Okul Öncesi Eğitim ve İlköğretim Kurumları Yönetmeliği [MONE Preschool and Elementary Institution Regulation], 2012).

When the new regulations were implemented in SY 2012–2013, students starting school thus varied in age from 60 to 84 months, or a two-year range. According to Goodlad and Anderson (1987), mental age data show a difference of four years in children at age 6. For example, first-grade students

aged from 5 years and 9 months to 7 years and 4 months have mental ages ranging from 3 years and 10 months to 8 years and 4 months (for a difference of four and a half years). Further, IQ differences have been observed: for example, a student with an IQ of 68 and another with an IQ of 129 are both in the same class with an IQ average of 101. Based on these data, the mental ages of Turkish children in the 60 to 84 months range in SY 2012–2013 would have mental ages ranging from three to nine years. The mental age range that has grown even larger in the Turkish education system may have effects on the academic development of students based on group instruction.

As regards the amendments introduced by Law No. 6287, the government claimed various studies were done throughout the country on the overall implementation both for first-grade enrollees in the first year of implementation and in subsequent years. Such works tapped the opinions of teachers, school administrators, parents, and non-governmental organizations using quantitative and qualitative approaches. These reports have asserted that participants generally had a negative opinion on the overall implementation (Bavlı & Aydın, 2015; Calp & Calp, 2015; Doğan, Demir, & Pınar, 2013; Epçaçan, 2015; Özden, Kılıç, & Aksu, 2014; Peker-Ünal, 2013). Based on the opinions of first-grade teachers, the readiness, school adaptation, encountered problems, and learning process for reading and writing of the students enrolled in first grade in SY 2012–2013 were taken into consideration in the context of their calendar age (Aybek & Aslan, 2015; Aykaç, Kabaran, Atar, & Bilgin, 2014; Başar, 2013; Boz & Yıldırım, 2014; Külekçi, 2013; Özenç & Çekirdekçi, 2013; Öztürk & Uysal, 2013; Sezginsoy-Şeker, 2015; Ünver, Dikbayır, &Yurdakul, 2014; Uzun & Alat, 2014). Further, first-grade teachers had the opinion that students starting school in the 60–69 months age range had insufficient readiness, encountered adaptation problems, and had difficulties in reading and writing.

These studies on teacher opinions, however, lacked data obtained directly from first-grade students, which may be attributed to the presumption that the opinions of teachers, administrators, parents, and all concerned parties on the development of first-grade students are more important. Nonetheless, the developmental effects of the implementation can only be determined in a more valid and reliable manner through analysis of data directly obtained from students. The purpose of the current research is to examine the effects on the academic development of students, of the age difference that increased even further after Law No. 6287 set an earlier schooling start age. In the process of achieving this aim, answers have been sought for the following questions:

1. Is there a meaningful difference in the level of readiness of elementary school students who started their first grade of elementary school under 69 months and those over 69 months in SY 2012–2013?

2. Is there a meaningful difference in the academic success of students who started their first grade of elementary school under 69 months and those over 69 months in SY 2012–2013 through semesters of grades one and two?

3. How is the trend of academic development of students who started their first grade of elementary school under 69 months and those over 69 months in SY 2012–2013 during two years of schooling?

Method

This study compares the readiness at the start of elementary school and academic development shown during two years, based on schooling year, of students newly enrolled in elementary school in SY 2012–2013, when the regulations set by Law No. 6287 were implemented. The effect of the age variable in readiness and academic success have been examined without any manipulation and fully based on current practices. In this respect, the research can be defined as a causal-comparative research (Gay & Airasian, 2006). The research is also a longitudinal research and a panel study type has been mostly used, as it takes into consideration the development of a group of students (panel) at varying ages (60 to 84 months) starting school in the same school year (2012–2013) for a certain period (two years).

Longitudinal studies "collect and analyze data from different points in a certain period to examine the change during such period" (Fraenkel & Wallen, s. 391). Van Ness, Fried, and Gill (2011) emphasized that repeated data collection during a certain period should be undertaken for at least three times or more; thus, experimental works with practices such as pretest-posttest are excluded from longitudinal research. In longitudinal research, the interpretation of qualitative patterns (Saldanã, 2003), analysis of visual graphics (Brown, McGuire, Beck, Peterson, & Mooney, 2007), or variance analysis of repeated measurements as well as analysis of implicit development curves (Long, 2012) are used in the analysis of data collected at different times.

Trend, cohort, and panel studies are commonly used in longitudinal research (Fraenkel & Wallen, s. 391). The "panel study" type has been used in the current longitudinal research, as data are collected from the same study group at different times. The study group or panel consists of students starting elementary school in SY 2012–2013; data are collected four times with six-month intervals.

Panel Group

The panel group of this longitudinal research consists of 2,081 students who started grade one in SY 2012–2013 in 39 private schools in four different provinces. The age distribution of these students ranges from 60 to 84 months as of September 2012. According to the purpose of the study, these 2,081 students were classified into younger and older age groups according to month as of

September 2012. The threshold was set at 69 months: students younger than 69 months constituted the younger age group, and students at or older than 69 months constituted the older age group. Consequently, 357 students were younger than 69 months (17%) and 1,724 students were at 69 months or older (83%). The distribution of the students constituting the panel group according to the younger and older age groups is presented in Table 1, together with gender information.

Table 1. Distribution of Students in the Study Group according to Age Group Classification

Age Group Classification	Gender	Frequency (f)	Percent (%)
Younger than 69 months	Male	188	52.7
	Female	168	47.1
	Unknown	1	0.3
	Total	357	100.0
69 months or older	Male	939	54.5
	Female	781	45.3
	Unknown	4	0.2
	Total	1724	100.0

Collection and Analysis of Data

Academic developmental monitoring data gathered by the Cito Turkey Pupil Monitoring System (PMS) were used at six-month intervals in two years. Thus, the study was performed based on monitoring of the same students for four semesters.

Cognitive Development (CD) Assessment

The students' readiness at the start of elementary school has primarily been analyzed in research on schooling age. In the current work, this examination was performed based on the Cognitive Development (CD) assessment data; the students participated in the standard test during the first semester of SY 2012–2013, and their readiness levels were determined by taking into consideration the cutoff scores generated according to the monthly intervals of the CD assessment (Cito Turkey, 2013; Cito Turkey, 2015a).

According to the framework of the PMS, students starting grade one of elementary school are given a CD assessment in the first semester, for which validity and reliability studies have been performed. Elementary school readiness is surveyed with this application regarding cognitive development, including the fields of Cognitive Concepts, Auditory Discrimination, Receptive Vocabulary, and Text Comprehension. Measurement is made in the field of "Cognitive Concepts" for recognizing and comparing basic and intense colors, geometrical shapes, quantities and locations, and understanding events and processes; in the field of "Auditory Discrimination" for distinguishing

vowels and consonants that distinguish meaning, words that have a similar sound but have one different sound; in the field "of Receptive Vocabulary," for identifying verb and noun words; and in the field of "Text Comprehension," for ability to understand information provided by direct or indirect narration. Scores obtained from the CD assessment are evaluated based on the monthly generated cutoff scores. Students who receive scores lower than the cutoffs in at least two subfields other than the Auditory Discrimination field are defined as students requiring help. Such students are monitored closely, especially their participation in suitable school activities (Arıkan, 2008; Arıkan & Berberoğlu, 2013; Cito Turkey, 2013; Cito Turkey, 2015a; Konak, Berberoğlu, Arıkan, Özgen Tuncer, & İş Güzel, 2010).

Pupil Academic Development Monitoring System (A-PMS)

Meanwhile, students' academic success in this work was compared on a semester basis, in accordance with the younger and older age groups classification. This comparison was realized using CD assessment data and data from the Pupil Academic Development Monitoring System (A-PMS), in which the students participated from their second to fourth semesters of study.

The A-PMS, a proven valid and reliable measuring tool and a standardized test, is generally conducted from the second semester of the first grade of elementary school to monitor academic development in fundamental course fields, namely, Mathematics, Turkish, Life Sciences, Science, and Social Sciences. To ensure comprehensive results, subfields are also tested: Numbers, Geometry, Measurement, and Probability and Statistics in Mathematics; Listening Comprehension, Reading Comprehension, Vocabulary, and Writing in Turkish; and Knowledge Behavior, and Notions in Life Sciences. The scores obtained from the A-PMS application are evaluated according to the proficiency descriptions given within the framework of proficiency tables. Thus, the strong and weak skills of students can be clearly identified. Students are not ranked or even compared in this evaluation, as the focus is on what students know and what they learned (Berberoğlu, 2009; Berberoğlu, 2012; Berberoğlu, İş Güzel, & Toker, 2011; Cito Turkey, 2013; Cito Turkey, 2015b; İş Güzel, 2008; İş Güzel, 2009; İş Güzel & Berberoğlu, 2013).

Additionally in the current study, as part of the monitoring of the students for two years, a developmental examination of academic successes was performed based on each field and subfield, in accordance with the basic course fields of the students in the younger and older age groups.

In the analysis of the data, multi-factor analysis of variance (MANOVA) was used to determine the score average differences of elementary school students that are under 69 months and those over 69 months on both readiness at the start of elementary school and academic success of the main fields and sub-fields. Effect size values were also analyzed to determine whether the identified differences have practical meaning (Hinkle, Wiersma, & Jurs, 1988).

Results and Comments

The results are presented in the same order as the research questions posed for the study.

Results and Comments Regarding the First Sub-Problem

The first question posed for the study was: "*Is there a meaningful difference in the level of readiness of elementary school students who started their first grade of elementary school under 69 months and those over 69 months in SY 2012–2013?".*

As regards the first research question, the readiness status of the students was examined using data from the CD assessment of 2,081 students in September in SY 2012–2013. Students requiring help were identified, with consideration for the monthly intervals (Cito Turkey, 2013; Cito Turkey, 2015a). The CD assessment scores were again taken into consideration for the comparison of the academic successes of the younger and older age groups. MANOVA was used to determine differences in the score averages in each field. The score averages of the younger and older age groups under the CD assessment fields are presented in Table 2. Differences varying between 30 and 37 points were observed in favor of the older age group in all of the CD assessment fields.

Table 2. Score Averages of the Two Age Groups in the First Semester (CD Assessment Fields)

Fields	Score averages: students younger than 69 months	Score averages: students 69 months or older	Difference
Cognitive Concepts	201.21	231.70	30.49
Auditory Discrimination	228.84	266.15	37.31
Receptive Vocabulary	197.51	231.44	33.93
Text Comprehension	288.03	318.33	30.30

According to the MANOVA, age group classification showed a statistically significant difference regarding score averages (Wilks' λ=0.933, $F_{(4,2076)}$=37.529, $p<0.05$, η^2=0.067). The effect size of the age group classification indicated an intermediate-size practical significance (Cohen, 1977). ANOVA results of the score averages in CD assessment fields showed significant differences: Cognitive Concepts ($F_{(1,274894.805)}$=97.662, $p<0.05$, η^2=0.045), Auditory Discrimination ($F_{(1,411787.999)}$=71.243, $p<0.05$, η^2=0.033), Receptive Vocabulary ($F_{(1,340358.817)}$=94.489, $p<0.05$, η^2=0.043), and Text Comprehension ($F_{(1,271454.423)}$=52.885, $p<0.05$, η^2=0.025). Effect sizes in each of the four fields indicated that these differences have small value practical significance (Cohen, 1977). Thus, regarding academic success, the younger age group was more disadvantaged with respect to the older age group, with respect to all four fields of the CD assessment.

Results and Comments Regarding the Second Sub-Problem

The second question posed for the study was: *"Is there a meaningful difference in the academic success of students who started their first grade of elementary school under 69 months and those over 69 months in SY 2012–2013 through semesters of grades one and two?".*

Comparison of Academic Success of Age Groups under the Fields and Subfields of the A-PMS in the Second Semester

The second semester A-PMS scores were taken into consideration for the comparison of the academic successes of the younger and older age groups. MANOVA was used to seek differences in their score averages in each field. The score averages of the younger and older age groups under the A-PMS fields are provided in Table 3. Differences varying between 14 and 35 points were observed in favor of the older age group in all of the A-PMS subfields.

The MANOVA, performed to determine the statistical significance of the score average differences, indicated that age group classification yielded statistically significant differences regarding score averages (Wilks' λ=0.948, $F_{(8,2072)}$=14.269, $p<0.05$, η^2=0.052). Based on an analysis of the effect size of the age group classification, a small size practical significance was found (Cohen, 1977). Results of the ANOVA applied according to the score averages of A-PMS fields showed significant differences in the subfields of Mathematics: Numbers ($F_{(1,239904.754)}$=85.412, $p<0.05$, η^2=0.039), Geometry ($F_{(1,135493.583)}$=22.004, $p<0.05$, η^2=0.010), and Measurement ($F_{(1,56103.030)}$=33.402, $p<0.05$, η^2=0.016). Significant differences were also seen in the score averages for the subfields of Turkish: Listening Comprehension ($F_{(1,359785.913)}$=60.858, $p<0.05$, η^2=0.028), Reading Comprehension ($F_{(1,65113.934)}$=15.189, $p<0.05$, η^2=0.007), and Vocabulary ($F_{(1,251052.134)}$=23.115, $p<0.05$, η^2=0.011). In the field of Life Sciences, significant differences were seen in the score averages for the subfields of Behavioral Knowledge ($F_{(1,208751.966)}$=30.436, $p<0.05$, η^2=0.014) and Notions ($F_{(1,299987.853)}$=53.650, $p<0.05$, η^2=0.025). However, these differences have small value practical significance (Cohen, 1977). Thus, the younger age group younger was disadvantaged with respect to the older group regarding academic success, and the former continued to have such disadvantage in all fields and subfields of the A-PMS.

Comparison of Academic Success of Age Groups under the Fields and Subfields of the A-SPMS in the Third Semester

The third semester A-PMS scores were again taken into consideration for the comparison of the academic successes of the younger and older age groups. This period coincided with the first semester of SY 2013–2014 school year. MANOVA was used to evaluate for differences in the score averages in each field. The score averages of the younger and older age groups under the A-PMS

fields are listed in Table 3. Differences varying between 22 and 37 points were observed in favor of the older age group in all of the A-PMS subfields.

As in the previous semester, statistically significant differences were observed in the score averages of both age groups (Wilks' λ=0.953, $F_{(8,2072)}$=12.838, $p<0.05$, η^2=0.047), although the effect size of the age group classification indicated a small size practical significance (Cohen, 1977). Score averages for the A-PMS fields showed significant differences for the subfields of Mathematics: Numbers ($F_{(1,221763.242)}$=53.605, $p<0.05$, η^2=0.025), Geometry ($F_{(1,207849.372)}$=37.168, $p<0.05$, η^2=0.018), and Measurement ($F_{(1,145162.418)}$=58.042, $p<0.05$, η^2=0.027); for the subfields of Turkish: Listening Comprehension ($F_{(1,218527.277)}$=47.615, $p<0.05$, η^2=0.022), Reading Comprehension ($F_{(1,151653.349)}$=39.220, $p<0.05$, η^2=0.019), and Vocabulary ($F_{(1,232785.254)}$=65.572, $p<0.05$, η^2=0.031); and for the subfields of Life Sciences, Behavior Knowledge ($F_{(1,274057.567)}$=48.136, $p<0.05$, η^2=0.023) and Notions ($F_{(1,412830.577)}$=61.096, $p<0.05$, η^2=0.029). Nonetheless, effect sizes indicated small value practical significance (Cohen, 1977). These results indicated the pervasive difference in academic success between the two age groups, valid for all fields and subfields in the A-PMS.

Table 3. Score Averages of the Two Age Groups in Semesters (A-PMS Fields and Subfields)

Fields	Subfields	Younger than 69 months			69 months and older			Difference		
		Second Semester	Third Semester	Fourth Semester	Second Semester	Third Semester	Fourth Semester	Second Semester	Third Semester	Fourth Semester
Mathematics	Numbers	33.20	59.61	115.32	61.68	86.99	142.04	28.48	27.38	26.72
	Geometry	65.20	68.46	85.06	86.61	94.97	102.69	21.41	26.51	17.63
	Measurement	23.03	36.04	63.83	36.80	58.19	92.48	13.77	22.15	28.65
Turkish	Listening Comprehension	142.58	147.18	168.38	177.46	174.37	196.61	34.88	27.19	28.23
	Reading Comprehension	154.94	178.10	203.01	169.78	200.74	226.79	14.84	22.64	23.78
	Vocabulary	150.73	175.05	212.01	179.87	203.10	240.49	29.14	28.05	28.48
Life Science	Knowledge Behavior	181.54	221.14	194.49	208.11	251.58	212.99	26.57	30.44	18.50
	Notions	144.22	166.20	197.15	176.07	203.57	222.40	31.85	37.37	25.25

Comparison of Academic Success of Age Groups under the Fields and Subfields of the A-PMS in the Fourth Semester

The fourth semester here refers to the second semester of SY 2013–2014. Similarly, MANOVA was used to evaluate differences in the score averages in each field based on the A-PMS data. Table 3 provides the score averages of the younger and older age groups under the A-PMS fields. Differences varying between 18 and 29 points were observed in favor of the older age group in all of the A-PMS subfields.

As in the previous semesters, statistically significant differences were seen in the score averages with respect to the age group classification (Wilks' λ=0.962, $F_{(8,2072)}$=10.142, $p<0.05$, η^2=0.038). Analysis of the effect size of the age group classification indicated a small size practical significance (Cohen, 1977). ANOVA results of the students' score averages for A-PMS fields showed significant differences: for the subfields of Mathematics, Numbers ($F_{(1,211258.515)}$=36.199, $p<0.05$, η^2=0.017), Geometry ($F_{(1,91904.566)}$=22.349, $p<0.05$, η^2=0.011), and Measurement ($F_{(1,242733.372)}$=52.023, $p<0.05$, η^2=0.024); for the subfields of Turkish, Listening Comprehension ($F_{(1,235780.391)}$=43.479, $p<0.05$, η^2=0.020), Reading Comprehension ($F_{(1,167174.196)}$=36.523, $p<0.05$, η^2=0.017), and Vocabulary ($F_{(1,239988.329)}$=50.220, $p<0.05$, η^2=0.024); and for the subfields of Life Sciences, Behavior Knowledge ($F_{(1,101165.796)}$=21.445, $p<0.05$, η^2=0.010) and Notions ($F_{(1,188522.994)}$=35.251, $p<0.05$, η^2=0.017). These differences have small value practical significance with respect to effect sizes (Cohen, 1977). Therefore, differences in the academic success in all the fields and subfields of the A-PMS between the two age groups persisted throughout the semesters.

Results and Comments Regarding the Third Sub-Problem

The last question posed for the study was: *"How is the trend of academic development of students who started their first grade of elementary school under 69 months and those over 69 months in SY 2012–2013 during two years of schooling?".*

In line with the last question, this study is based on a monitoring of students starting elementary school in SY 2012–2013 for a period of four semesters or two years. Statistically significant differences have been observed in the academic success score averages for all fields and subfields of the A-PMS performed at six-month intervals on the younger and older age groups. This analysis on the differences based on the fields and subfields is expected to contribute to the interpretation of the results. Thus, the score averages of the younger and older age groups shall be analyzed in terms of student development in each A-PMS field and subfield based on data for three semesters.

Monitoring of the Academic Development of Two Age Groups in Mathematics - Numbers

Table 3 shows data on the score averages analyzed for the Mathematics field, Numbers subfield, from the first semester of grade one to the second semester of grade two, for the younger and older age groups. A score difference of 29 points was observed in the second semester of grade one and 27 points in the first and second semesters of grade two.

MANOVA was performed to determine if these score average differences are statistically significant, and it indicated that age group classification showed statistically significant difference for the Numbers subfield score averages (Wilks' λ=0.957, $F_{(3,2077)}$=31.430, $p<0.05$, η^2=0.043). Analysis of the effect size of the age group classification indicated a small size practical significance (Cohen, 1977).

The Numbers score averages of the younger and older age groups are provided in Figure 1, together with the A-PMS proficiency levels. The score averages of both groups showed a statistically significant difference for three semesters. Further, the score average of the older age group was almost equivalent to fourth level in grade one, semester two, whereas the scoring average of the younger age group remained in third level. In grade two, semester one, the scoring average of the older age group was equivalent to third level, whereas that of the younger age group decreased to second level. Both age groups increased to fourth level in grade two, semester two. Thus, the younger and older age groups had differences in skills, in the context of their proficiency levels in higher-level thought processes. For example, students in the older age group were able to use their problem-solving skills during grade one, semester two, whereas those in the younger age group could only do operations. Although students in both age groups could solve familiar problems in grade two, semester two, their degree of development in this skill differed, based on their score differences.

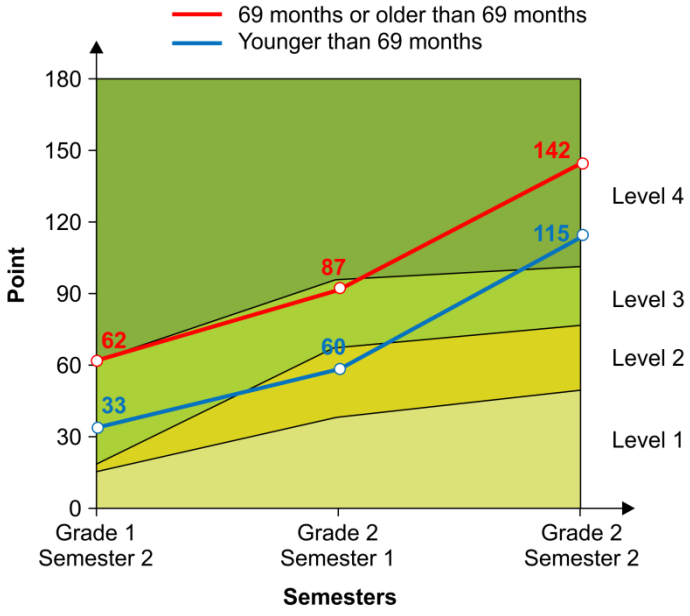

Figure 1. Score Averages of the Two Age Groups for A-PMS Mathematics, Numbers

Monitoring of the Academic Development of Two Age Groups in Mathematics - Geometry

In the context of tracking the same students, the data provided in Table 3 shows the score averages of the Mathematics subfield Geometry from the first semester of grade one to the second semester of grade two, for the younger and older age groups. Score differences of 21 points in the second semester of grade one, 27 points in the first semester of grade two, and 18 points in the second semester of grade two were observed.

Similar to the previous subfield explored, age group classification showed a statistically significant difference regarding the Geometry subfield score averages (Wilks' λ=0.977, $F(3,2077)=16.568$, $p<0.05$, $\eta 2=0.023$), although a small size practical significance when effect size was considered (Cohen, 1977).

Figure 2 shows the Geometry subfield score averages of the younger and older age groups, together with the A-PMS proficiency levels. The score averages of both age groups were equivalent to fourth level proficiency, the highest level, albeit with a statistically significant difference between the two groups. This difference persisted throughout three semesters.

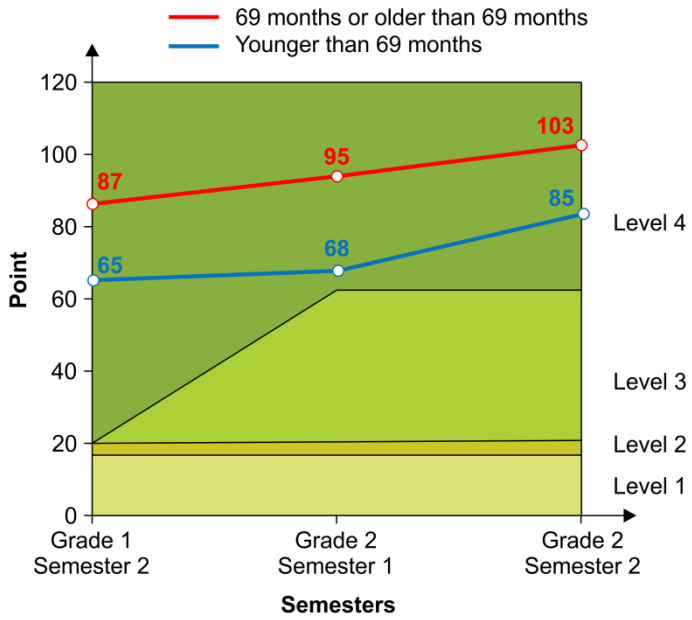

Figure 2. Score Averages of the Two Age Groups for A-PMS Mathematics, Geometry

Monitoring of the Academic Development of Two Age Groups in Mathematics - Measurement

The score averages for the Mathematics subfield Measurement from the second semester of grade one to the second semester of grade two for both age groups are provided in Table 3. In the same students, the results showed a score difference of 14 points in second semester of grade one, 22 points in the first semester of grade two, and 29 points in the second semester of grade two.

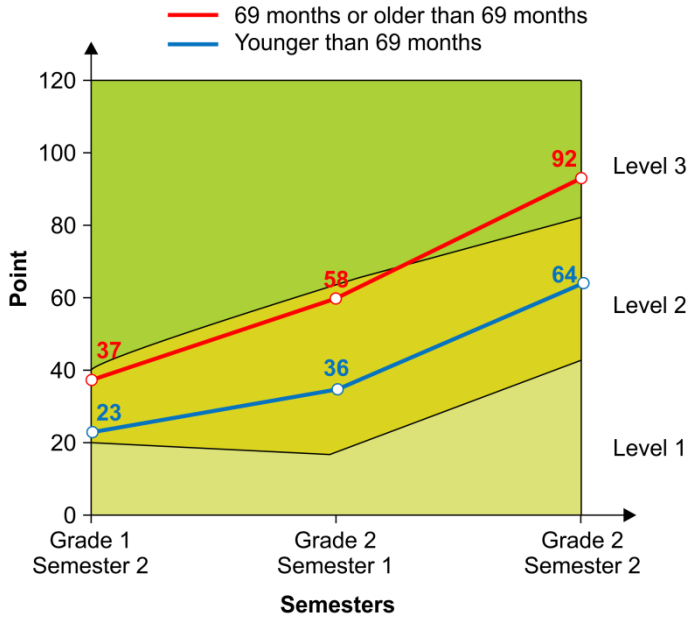

Figure 3. Score Averages of the Two Age Groups for A-PMS Mathematics, Measurement

Again, age group classification showed a statistically significant difference regarding the Measurement score averages (Wilks' λ=0.963, $F_{(3,2077)}$=26.372, $p<0.05$, η^2=0.037), albeit one with a small size practical significance (Cohen, 1977). A statistically significant difference is observed in Figure 3, which shows the Measurement score averages of the two age groups together with the A-PMS proficiency levels. The difference persisted and even increased for three semesters. Further, the score averages of both groups remained at second level in grade one, semester two and grade two, semester one. The scoring average of the younger age group remained at second level, whereas that of the older age group increased to third level in grade two, semester two. These findings indicated differences regarding the skills of the younger and older age groups in the Measurement subfield. For example, students in the younger age group in grade two, semester two have defects in such skills as predicting, comparing situations, and inferring about comparisons, with respect to the older age group.

Monitoring of the Academic Development of Two Age Groups in Turkish – Listening Comprehension

In the field of A-PMS field of Turkish, score averages of the same students were analyzed for significant differences. Table 3 shows data for the Turkish subfield Listening Comprehension from the second semester of grade one to the second semester of grade two, for both age groups created. Score difference of 35, 27, and 28 points were observed for the second semester of grade one, first semester of grade two, and second semester of grade two, respectively.

A small size practical significance (Cohen, 1977) was found in the score average differences with respect to the age group classification for Listening Comprehension (Wilks' λ=0.963, $F_{(3,2077)}$=26.441, $p<0.05$, η^2=0.037). The score averages of the two age groups for the Turkish subfield Listening Comprehension (shown in Figure 4 together with their A-PMS proficiency levels) were equivalent to fourth level proficiency, the highest level, although the two groups' scores had a statistically significant difference that persisted throughout three semesters.

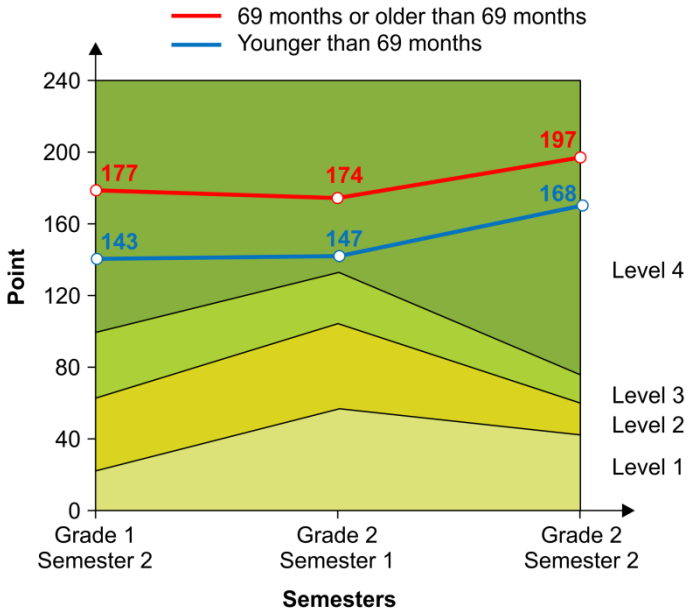

Figure 4. Score Averages of the Two Age Groups for A-PMS Turkish, Listening Comprehension

Monitoring of the Academic Development of Two Age Groups in Turkish – Reading Comprehension

In Table 3, the score averages of both age groups for the Turkish subfield Reading Comprehension from the second semester of grade one to the second semester of grade two show differences of 15, 23, and 24 points in the three successive semesters covered.

The result of the MANOVA performed to determine if these score average differences are statistically significant indicated that age group classification showed a statistically significant difference regarding the Reading Comprehension subfield score averages (Wilks' λ=0.977, $F_{(3,2077)}$=16.069, $p<0.05$, η^2=0.023). Analysis of the effect size of the age group classification indicated a small size practical significance (Cohen, 1977).

The Turkish subfield Reading Comprehension score averages of the two age groups, provided in Figure 5 with the A-PMS proficiency levels, showed equivalence to third level proficiency, the highest level, but with a statistically significant difference that persisted throughout three semesters.

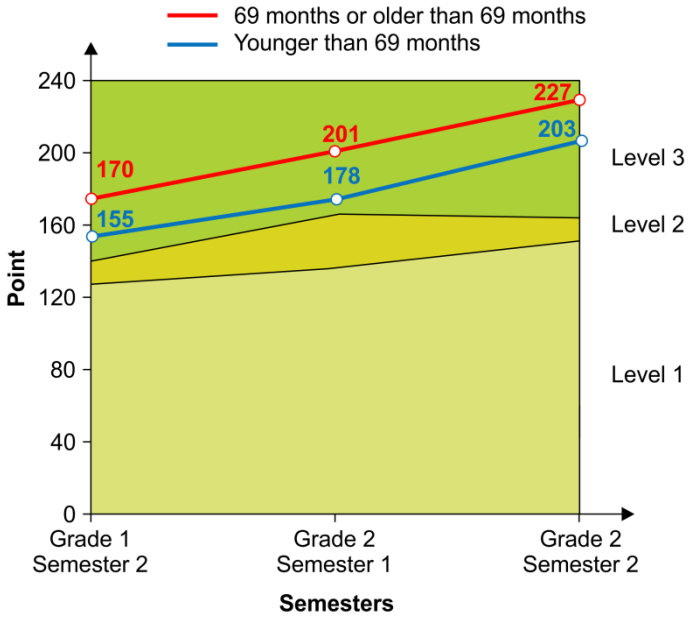

Figure 5. Score Averages of the Two Age Groups for A-PMS Turkish, Reading Comprehension

Monitoring of the Academic Development of Two Age Groups in Turkish – Vocabulary

Table 3, which shows the score averages of the two age groups of the same students for the Turkish subfield Vocabulary from the second semester of grade one to the second semester of grade two, shows score differences of 29, 28, and 29 points in the successive semesters analyzed.

The MANOVA similarly revealed that age group classification showed a statistically significant difference regarding Vocabulary subfield score averages (Wilks' λ=0.962, $F_{(3,2077)}$=27.256, $p<0.05$, η^2=0.038), with a small size practical significance (Cohen, 1977).

Figure 6 shows the score averages of the students in Turkish Vocabulary. Proficiency descriptions have not been made for this subfield. As in the other subfields, a statistically significant difference was seen between the score averages of both groups for three semesters.

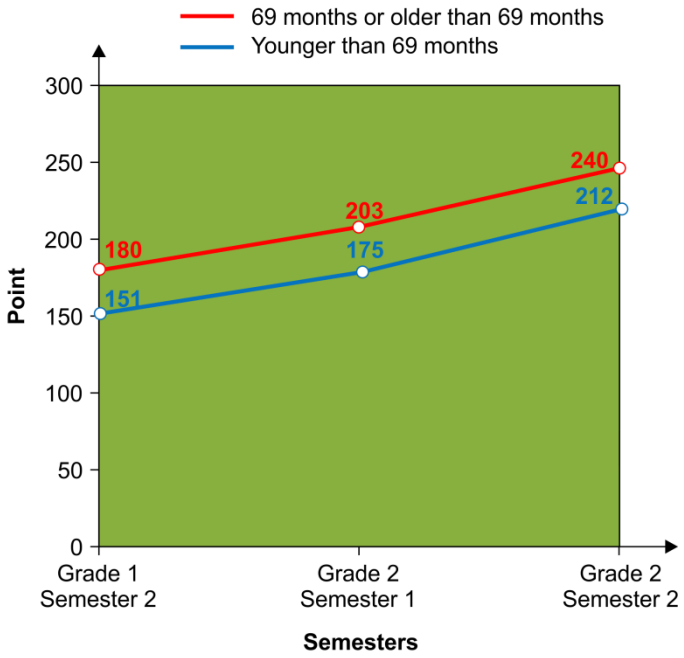

Figure 6. Score Averages of the Two Age Groups for A-PMS Turkish, Vocabulary

Monitoring of the Academic Development of Two Age Groups in Life Science – Knowledge Behavior

The same students' score averages for the Life Science subfield Knowledge Behavior from the second semester of grade one to the second semester of grade two are provided in Table 3 as well. The score differences observed were 27 points in the second semester of grade one, 30 points in the first semester of grade two, and 19 points in the second semester of grade two.

The same trends found in the other fields were observed for this subfield. Age group classification showed a statistically significant difference with respect to score averages (Wilks' λ=0.973, $F_{(3,2077)}$=19.419, $p<0.05$, η^2=0.027). A small size practical significance was identified (Cohen, 1977).

The score averages of the same students in both age groups for the Life Science subfield Knowledge Behavior are provided in Figure 7. Proficiency descriptions have also not been made for this subfield. A statistically significant difference was seen between the score averages of the two groups for three semesters, albeit with a slight decrease in the last semester, second semester of grade two.

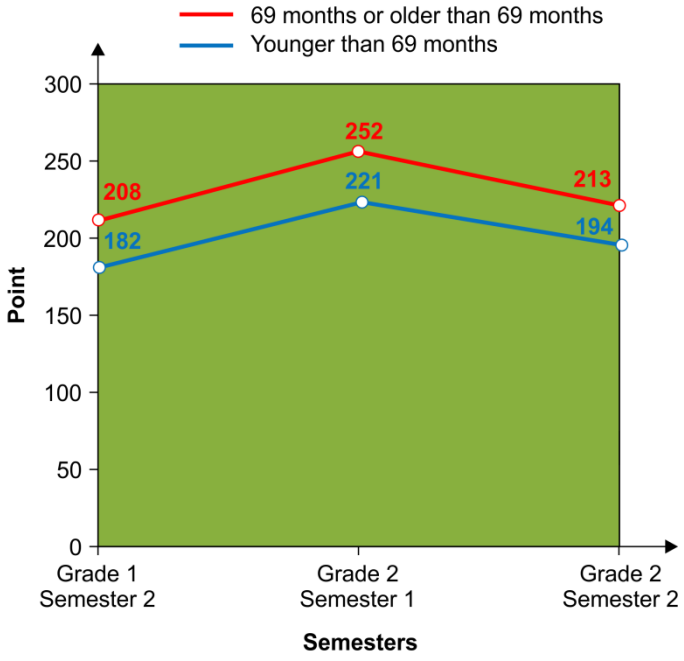

Figure 7. Score Averages of the Two Age Groups for A-PMS Life Science, Knowledge Behavior

Monitoring of the Academic Development of Two Age Groups in Life Science – Notions

Data of the same students for the Life Science subfield Notions field are shown in Table 3. Score differences of 32, 37, and 25 points were observed in the three successive semesters from the second semester of grade one to the second semester of grade two.

Age group classification still showed a statistically significant difference, but a small size practical significance (Cohen, 1977), regarding the Notions subfield score averages (Wilks' λ=0.961, $F_{(3,2077)}$=27.935, $p<0.05$, η^2=0.039).

As in the case of the Behavior Knowledge, Life Science subfield, a statistically significant difference was seen between the score averages of both groups, consistent for three semesters (Figure 8).

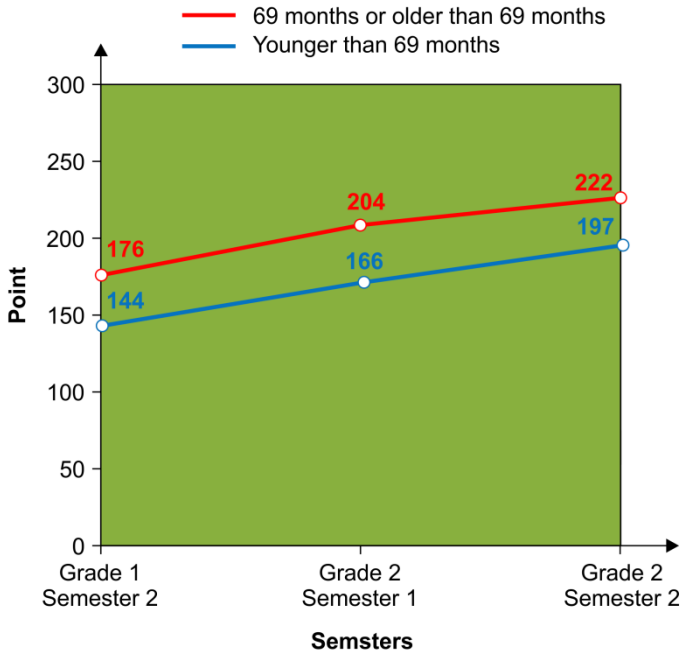

Figure 8. Score Averages of the Two Age Groups for A-PMS Life Science, Notions

Discussion, Conclusion and Suggestions

The findings here indicate that the cognitive development of students who started elementary school in SY 2012–2013 at age less than 69 months had the necessary skills, albeit at lower level compared with those who started at or older than 69 months, in the fields of cognitive development as cognitive concepts, sound distinguishing, passive vocabulary, and text comprehension. Significant differences in the range of 30 to 37 points were observed, in favor of the older age group in all fields. In other words, the younger and older age groups had a significant difference in their readiness for elementary school. Readiness, which expresses the state of a student being ready for school and the school for the student, family, and environment, is regarded as the basis of opportunity for equality and high-quality education (UNICEF, 2012). Thus, setting the schooling age to 60 months increased heterogeneity in student readiness in classes. Indeed, the current findings indicate that, based on data obtained directly from students, students in the younger age group started school in SY 2012–2013 without a sufficient level of readiness compared with the students in the older group.

In addition to the significant difference of levels of readiness of the younger age group compared to the older group in terms of cognitive development, research based on the opinions of grade one teachers concluded that the younger age group had insufficient levels of self-care skills (Başar, 2013; Boz & Yıldırım, 2014; Özden et al., 2014; Özenç & Çekirdekçi, 2013; Sezginsoy-Şeker, 2015; Uzun & Alat, 2014). Particularly, their fine motor skills and hand-finger muscles had not sufficiently developed, thus experienced difficulties in writing (Aykaç et al., 2014; Boz & Yıldırım,

2014; Doğan et al., 2014; Öztürk & Uysal, 2013); had insufficient levels of understanding and following directives (Boz & Yıldırım, 2014); and had low basic skills such as knowing colors, numbers, large–small relations (Uzun & Alat, 2014). Teachers expressed that the game-based adaptation process implemented in the first three months of school is also not effective (Külekçi, 2013; Sezginsoy Şeker, 2015). The factors making the adaptation and preparation process ineffective include insufficiency in the adaptation, preparation of grade one programs, and physical environments (Aybek & Aslan, 2015; Bavlı & Aydın, 2015; Peker-Ünal, 2013; Ünver et al., 2014); and unpreparedness of teachers to an education process requiring age differences (Aybek & Aslan, 2015; Bavlı & Aydın, 2015; Boz & Yıldırım, 2014; Doğan et al., 2014; Sezginsoy & Şeker, 2015; Ünver et al., 2014; Uzun & Alat, 2014). So, the aforementioned research based on the opinions of teachers, administrators, and families indicate that the schools, teachers, parents, and the environment are not ready especially for the students in the younger age group.

Monthly difference is an important factor regarding student development especially at younger ages. The 24 months, or two years, of difference in this study proved to be significant. Large differences were observed in the levels of readiness and cognitive development among students having an age difference of as much as 2 years. Further, students showing normal development despite their age criteria may become problematic students; owing to their lacking readiness, they may not respond well to studying with peers from an older age group (İş Güzel, Şahin, & Konak, 2014).

In accordance with these results, the younger age group will be disadvantaged with respect to many aspects especially for the school readiness in terms of cognitive development if the "4+4+4 regulation" continues in the similar way where there is a large age distribution in classes. Thus, the authors believe that, policy makers should consider the age distributions in classes for the arrangement of educational regulations or decisions especially for the pre-school education and the elementary education, or should take some precautions to avoid large age distributions in classes.

In accordance with these results, the authors believe that, in the "4+4+4 regulation," the 60 to 72 months age range should be set as pre-school age, with primary school beginning after. Thus, the regulation should be revised as "1+4+4+4." In fact, the two-year pre-school education implemented with successful results in other countries should even be taken into consideration.

The failure to take into consideration the readiness levels of students starting school is reflected in the academic outcomes of students as well. Academic success of the students starting elementary school at younger than 69 months old is significantly lower compared with their older peers in all fields and subfields including Mathematics – Numbers, Geometry and Measurement; Turkish – Listening Comprehension, Reading Comprehension and Vocabulary; Life Science –

Knowledge Behavior and Notions. Consequently, the current findings indicate that, based on data obtained directly from students, students in the younger age group has lower academic success in all fields and subfields compared with the students in the older group who started school in SY 2012-2013. It seems that the difference on the school readiness of the younger and older groups continues on the academic success through the years of schooling. In addition, the gap in terms of the academic development of the students of younger and older groups is protected almost constantly for the semesters for all fields and subfields showing a stable trend in the academic development. Thus, the disadvantage against the younger group of students on school readiness still goes on for the academic success at elementary education throughout the two year period in all fields and subfields showing a constantly protected difference trend on academic development.

Although students in the same class are at the close-ranged, as known, students during pre-school, elementary school, and later periods shall inevitably have different characteristics, as well as different strengths and weaknesses. Even if the large age distribution in classes is avoided, of course, students in the same class will still have minor age differences. Therefore, these differences need to be taken into consideration. Teachers should individualize and differentiate education rather than implement collective teaching. Otherwise, an increase in developmental differences arising from age differences among students will be inevitable. As the students' individual differences are ignored, schools may be seen as shaping homogenous citizens. In this regard, the professional qualifications of teachers require attention, especially in their provision of individualization and differentiation in education. Teachers should be given professional training for this, and future teachers in teacher training programs should be given competencies in this respect.

The failure of the Ministry of National Education (MONE) to take school readiness as a basis in their reform and the difference exceeding two years in the schooling ages of students have resulted in significant differences in the cognitive and academic development of students. Not only taking chronological age as a basis for schooling, the MONE should execute processes for determining the readiness of the students, teachers, and families toward the learning environments and vice versa.

The present research is limited to monitoring the two-year development of the students who started school in SY 2012–2013. Their social and academic development could be further examined by monitoring throughout their elementary, middle, and high school education, and even until their graduation from university. Such a longitudinal research may thus cover the critical stages of Transition from Primary Education to Secondary Education System (TEOG), Transition to Higher Education Examination (YGS), and Undergraduate Placement Examination (LYS), among others.

References

Arıkan, S. (2008). Cognitive development application in the Cito Turkey student monitoring system (SMS). *Cito Education: Theory and Practice, Introduction Issue, 1*, 27–31.

Arıkan, S., & Berberoğlu, G. (2013). Analysis of cognitive development application regarding cultural affinity. *Cito Education: Theory and Practice, 20*, 9–16.

Aybek, B., & Aslan, S. (2015). Analysis of opinions of elementary school grade one teachers on the problems encountered in the 4+4+4 discontinuous compulsory education system and solution suggestions. *Pegem Education and Teaching Journal, 5*, 237–346.

Aykaç, N., Kabaran, H., Atar, E., & Bilgin, H. (2014). Evaluation of problems encountered by elementary school grade one students as a result of the 4+4+4 education system, based on the opinions of teachers. *Turkish Studies, 9*, 335–348.

Başar, M. (2013). Evaluation of personal self-care and first reading-writing skills of students starting elementary school at age 60-66 months, based on opinions of teachers. *Turkish Studies, 8*, 241–252.

Bavlı, B., & Aydın, H. (2015). Primary school teachers' views on compulsory education (4+4+4): a sample of Bayrampasa District. *International Online Journal of Educational Sciences, 7*, 84–94.

Berberoğlu, G. (2009). Material mapping method and determining proficiency levels in the Cito Turkey student monitoring system (SMS). *Cito Education: Theory and Practice, 3*, 13–24.

Berberoğlu, G. (2012). Scope validity. *Cito Education: Theory and Practice, 15*, 9–16.

Berberoğlu, G., İş Güzel, Ç., & Toker, N. (2011). Vertical expression of proficiency definitions in the student monitoring system. *Cito Education: Theory and Practice, 13*, 9–12.

Boz, T., & Yıldırım, A. (2014). Difficulties encountered by grade one teachers in the 4+4+4 education system. *Başkent University, Education Faculty Journal, 1*, 54–65.

Brown, C. G., McGuire, D. B., Beck, S. L., Peterson, D. E., & Mooney, K. H. (2007). Visual graphical analysis: A technique to investigate symptom trajectories over time. *Nursing Research, 56*, 195–201.

Calp, Ş., & Calp, M. (2015). The 4+4+4 education system from the perspective of the branch and elementary teachers. *Turkish Studies, 10*, 383–406.

Cito Turkey. (2013). *Cito Türkiye tanıtım kitapçığı* [Cito Turkey introductory booklet]. Ankara, Turkey: Cito Yayınları.

Cito Turkey. (2015a). *Cito Türkiye BG uygulama kılavuzu* [Cito Turkey CD application guide]. Ankara, Turkey: Cito Yayınları.

Cito Turkey. (2015b). *Cito Türkiye A-ÖİS yeterlik kitapçığı* [Cito Turkey A-PMS proficiency booklets]. Ankara, Turkey: Cito Yayınları.

Cohen, J. (1977). *Statistical power analysis for behavioral sciences*. New York: Academic Press.

Doğan, S., Demir, S. B., & Pınar, M. A. (2014). Evaluation of the 4+4+4 discontinuous compulsory education according to the opinions of elementary teachers. *Elementary Education Online, 13*, 503–517.

Epçaçan, C. (2015). Opinions of elementary and middle school teachers on the 4+4+4 education system regarding certain variables. *Turkish Studies, 10*, 387–408.

Fraenkel, J. R., & Wallen, N. E. (2008). *How to design and evaluate research in education*. New York: McGraw-Hill.

Gay, L., Mills. G., & Airasian, P. (2006). *Educational research: Competencies for analysis and application*. New York: Prentice Hall.

Goodlad, J. I., & Anderson, R. H. (1987). *The non-graded elementary school*. New York: Teachers College, Columbia University Press.

Hinkle, D. E., Wiersma, W., & Jurs, S. G. (1988). *Applied statistics for the behavioral sciences.* Boston: Houghton Mifflin Company.

İş Güzel, Ç. (2008). The structure of the mathematics field in the Cito Turkey student monitoring system (SMS). *Cito Education: Theory and Practice, Introduction* 1, 32–36.

İş Güzel, Ç. (2009). Measuring problem-solving skills in the Cito Turkey student monitoring system (SMS) and sampling and evaluation with activities and questions. *Cito Education: Theory and Practice, 4*, 9–20.

İş Güzel, Ç., & Berberoğlu, G. (2013). What are the skills that students should gain in the Turkish education system? *Cito Education: Theory and Practice, 19*, 9–16.

İş Güzel, Ç., Şahin, A. E, & Konak, Ö. A. (2014). Analysis of the readiness levels and score averages of students starting school at different ages in the 4+4+4 system. *Cito Education: Theory and Practice, 26*, 9–22.

Konak, Ö. A., Berberoğlu, G., Arıkan, S., Özgen Tuncer, Ç., & İş Güzel, Ç. (2010). Cognitive and language skill under school readiness. *Cito Education: Theory and Practice, 8*, 9–20.

Külekçi, E. (2013). Evaluation of the opinions of teachers on the unified class practice under the 4+4+4 education system. *Education and Teaching-Research Journal, 2*, 369–77.

Long, J. D. (2012). *Longitudinal data analysis for the behavioral sciences using R*. Los Angeles, CA: Sage.

MEB İlköğretim Kurumları Yönetmeliği [MONE Elementary Institution Regulation]. (2003). *T.C. Resmi Gazete*, 25212, 27 Ağustos 2003. [T.R. Official Gazette No. 25212, 27 August 2003].

MEB Okul Öncesi Eğitim ve İlköğretim Kurumları Yönetmeliği [MONE Preschool and Elementary Institution Regulation]. (2012). *T.C. Resmi Gazete,* 28360, 21 Temmuz 2012. [T.R. Official Gazette No. 28360, 21 July 2012].

Özden, B., Kılıç, R., & Aksu, D. (2014). Opinions of elementary teachers on 12 years (4+4+4) compulsory education. *Uşak University Social Sciences Journal, 7*, 181–202.

Özenç, M., & Çekirdekçi, S. (2013). Opinions of teachers regarding problems encountered by students (60-69-month-old) in the pre-school period, enrolled in grade one of elementary school. *Abant İzzet Baysal University Education Faculty Journal, 13*, 177–192.

Öztürk, E., & Uysal, K. (2013). Comparison of reading-writing processes of elementary school grade one student regarding calendar age. *Turkish Studies, 8*, 1041–154.

Peker-Ünal, D. (2013). Opinions of elementary teachers on the 4+4+4 regulation. *Education and Teaching-Research Journal, 2*, 324–337.

Saldanã, J. (2003). *Longitudinal qualitative research: Analyzing change through time*. Walnut Creek, CA: AltaMira Press.

Sezginsoy-Şeker, B. (2015). The evaluation of 1st-grade school teachers' views about orientation and preparation programs. *Journal of Educational Sciences Research, 5*, 19–37.

UNICEF (2012). S*chool readiness and transition*. New York: UNESCO.

Uzun, E. M., & Alat, K. (2014). Opinions of elementary school grade one teachers on the 4+4+4 education system and readiness of students who are starting school after this system. *Abant İzzet Baysal University Education Faculty Journal, 14*, 15–44.

Ünver, G. B., Dikbayır, A., & Yurdakul, B. (2014). Analysis of discontinuous compulsory education elementary school grade one practices. *Kastamonu Education Journal, 23*, 1647–1664.

Van Ness, P. H., Fried, T. R., & Gill, T. M. (2011). Mixed methods for the interpretation of longitudinal gerontologic data: Insights from philosophical hermeneutics. *Journal of Mixed Methods Research, 5*, 293–308.

World Bank. (2015). Official entrance age to primary education. Retrieved from http://data.worldbank.org/indicator/SE.PRM.AGES