Cilt 5 / Sayı 3, 2017
Eğitimde Nitel Araştırmalar Dergisi - ENAD
Journal of Qualitative Research in Education - JOQRE

Comparing Turkish Early Childhood Education Curriculum with Respect to Common Core State Standards for Mathematics

Türk Okul Öncesi Eğitim Programı ile Ortak Temel Eyalet Standartlarının Matematik Bağlamında Karşılaştırılması

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To cite this article/Atıf için:
Öçal, T. (2017). Comparing Turkish early childhood education curriculum with respect to common core state standards for mathematics. *Eğitimde Nitel Araştırmalar Dergisi - Journal of Qualitative Research in Education,* 5(3), 155-171. www.enadonline.com DOI: 10.14689/issn.2148- 2624.1.5c3s7m

Abstract. Increasing recognition of mathematics in society and its effects in development of children takes attention to early childhood education and as a result early childhood curriculum. Although children have informal mathematical knowledge before they begin formal schooling, a qualified mathematics education during early childhood will enrich and prevent learning difficulties in further years. For this purpose, the aim of the study was to compare Turkish Early Childhood Education Curriculum (TECEC) objectives with respect to kindergarten level Common Core State Standards for Mathematics (CCSSM). The study carried out as a document analysis method. Results are presented under five domains of CCSSM; counting and cardinality, operations and algebraic thinking, number and operations in base ten, measurement and data, and geometry. Results of the study indicate that TECEC and CCSSM for kindergarten level have both similarities and differences. While CCSSM dedicate more time numbers than other topics, TECEC gives significance to many mathematical skills not specifically the numbers like geometry, measurement, etc. About numbers topic in CCSSM have in depth expectations from children. Some other differences are also seen in patterning topic in TECEC and in place value topic in CCSSM. More similarities are found in geometry domain in both TECEC and CCSSM.

Keywords: Turkish early childhood education curriculum, mathematics education, common core state standards

Öz. Toplumda matematik ve çocuğun gelişimindeki etkileri konularındaki farkındalıkların artması, okul öncesi eğitime ve dolayısıyla da okul öncesi eğitim programına dikkatleri çekmiştir. İlkokula başlamadan önce çocuklar hâlihazırda matematiksel bilgiye sahip olsalar da, okul öncesi dönemde verilecek nitelikli bir matematik eğitimi onların daha sonraki yıllarda kazanılacak matematiksel bilgilerinin zenginleşmesini sağlarken karşılaşılabilecekleri muhtemel matematiksel zorluklarında önüne geçmelerini sağlayacaktır. Bu çalışmanın amacı, Türkiye Okul Öncesi Eğitim Programı (TECEC) kazanımlarının Common Core State Standards for Mathematics (CCSSM) ile karşılaştırmaktır. Çalışma doküman analizi yöntemi ile gerçekleştirilmiştir. Sonuçlar sunulurken CCSSM'in sayma ve kardinalite, işlemler ve cebirsel düşünme, on tabanında sayılar ve işlemler, ölçme ve veri ve son olarak geometri olmak üzere beş alanında sunulmuştur. Çalışma bulguları TECEC ile CCSSM belgelerinde okul öncesi eğitimi seviyesinde benzerlik ve farklılıkları işaret etmiştir. CCSSM sayılara diğer konulara göre daha fazla zaman ayırırken TECEC, geometri, ölçme gibi birçok matematiksel beceriye önem vermektedir. CCSSM'deki sayılar konusunda çocuklardan büyük beklentiler bulunmaktadır. Bazı diğer değişiklikler ise TECEC'de bulunan örüntü konusunda ve CCSSM'de bulunan basamak değeri konularında görülmüştür. Geometri alanında ise birçok benzerlik bulunmuştur.

Anahtar Kelimeler: Türkiye okul öncesi eğitim programı, matematik eğitimi, ortak temel eyelet standartları

Article Info
Recieved: 13.06.2017
Revision: 23.10.2017
Accepted: 20.11.2017

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Introduction

Mathematics is defined as an assistant element in understanding life and the world, and has also methods used to illuminate and generate ideas about life and the world around us (Ernest 1991). Yenilmez (2010) as well mentioned mathematics' role in development of individual's opinions and in their scope of thoughts, and added that mathematics has a place in development of a country and in forming of information society. Hence, considering the significance of mathematics in individual's life, it is usual to begin mathematics education in early years. These early years are significant and education during these years is observed and thought as important in the development of children. Meanwhile, for children to be successful in mathematics, the content should be rich in itself and connected.

In recent years, there is an increasing recognition of importance of mathematics in society and also its importance in the development of children. This situation results in an attention to early childhood mathematics education. Besides, as known children possess broad and complex informal mathematical knowledge before they begin formal schooling (Clements and Sarama 2008). A qualified mathematics education given in early childhood education will possibly prevent any learning difficulty occurred during elementary school years (Fuson, Smith, and Lo Cicero 1997; Tsamir, Tirosh, and Levenson 2011). To many studies and documents, in early years if children given an opportunity about mathematics education this education will help them to gain basic mathematical skills and knowledge (Kilday 2010; National Association for the Education of Young Children [NAEYC] 2002). Eventually, children are expected to be successful both in school and in life if and only if they have strong foundation in mathematics.

What is meant by curriculum vary widely. But it is generally seen as a plan for action or written document that includes strategies for achieving desired goals or ends (Ornstein and Hunkins 2004). These desired goals and ends serve guides for teachers to structure their instructional process along with the context of their lessons. An appropriate curriculum and the instructional process should consider children's readiness as an age and background knowledge, and also the experiences children will have and the comprehension of mathematics concepts (NAEYC 2002; National Council of Teachers of Mathematics [NCTM] 2000). When we consider Common Core State Standards for Mathematics (CCSSM), it was firstly released as a draft in United States of America in 2010. Its main aim was to have few, clear and high standards. Moreover, about mathematics education in United States it is criticized with the fact that US curriculum includes many topics in each grade but they have little depth. So, the promises of Common Core State Standards (CCSS) are to share a common language about students' previous learning experiences and the development of high quality materials appropriate to these standards. It specifically indicated what will be taught at each grade level. About CCSSM for kindergarten, instructional time is devoted to representing, relating, and operating on whole numbers initially with set of objects and describing shapes and space. More learning time is dedicated to number than to other topics in CCSSM (CCSS 2012). Besides, some researchers stated CCSSM has different expectations like emphasizing higher order thinking and conceptual understanding (Porter, McMaken, Hwang, and Yang 2011). But still counting is at the very core of mathematical development of numerical knowledge and for early childhood mathematics education, number and operations are arguably the most important mathematical learning area. For instance, the National Research Council (2009) in USA specified mathematical content for 3-6 age group as number, geometry, spatial relations and measurement. And NCTM, in a similar vein, defined content standards under number and operations, algebra, geometry, measurement, and data analysis and probability (NCTM 2000).

When the condition in Turkey is considered, in 2013-2014 academic year, schooling rate for 4-5 years old children is 37.46% (Ministry of National Education [MoNE] 2014). But by the year 2018 gross schooling rate for this age group is planned to be increased to 70 % (Ministry of Development [MoD] 2014). However, this rate is still lower than Organization for Economic Co-operation and Development (OECD) countries which has an average of 84 % for 4 year old children in 2012 (OECD 2014). About Turkish Early Childhood Education Curriculum, it has been recently revised according to feedbacks on the 2006 Early Childhood Education Curriculum, national and international researches, and Strengthening Pre-School Education Project (MoNE 2013). Actually, 2013 TECEC is named as "updated curriculum" (Dilek 2016). Some of the changes done in 2013 TECEC with respect to 2006 Early Childhood Education Curriculum are; objective and indicator were began to be used instead of goal and objective, explanations regarding each objective and indicator are provided, science and mathematics activities are separated as science activity and mathematics activity, etc. About 2013 TECEC, mathematical concepts and skills are presented under cognitive development skills among five development characteristics (Cognitive development skills, language development, social and emotional development, motor development, and self-care skills). In the curriculum for three age groups as well the objectives are defined separately (36-48 months old, 48-60 months old, and 60-72 months old children).

There are various studies regarding comparison of TECEC with respect to different countries' early childhood curricula or modern early childhood approaches (e.g. İncikabı and Tuna 2012; Tuncer 2015). In İncikabı and Tuncer's study, they aimed to compare Turkish and American educational systems' similarities and differences based on mathematical issues in early childhood education curricula for 60-72 months old children. They found out differences in general principles and objectives of both curricula. About specifically CCSSM, most of the researches focused on K-12 mathematics in CCSSM (e.g. Bush and Karp 2013; Erbilgin 2014; Jimenez and Staples 2015). For instance, Jimenez and Staples (2015) determined that there is a functional relationship between the early numeracy skill instructions on grade aligned 4^{th} and 5^{th} grade Common Core math skill and students' independent correct responses. On the other hand, Erbilgin (2014) analyzed Turkey's elementary and middle school mathematics standards with general topic trace mapping. At the end of this study, data showed that Turkey's elementary school standards include more topics while the middle school standards include fewer with respect to Common Core State Standards and other high achieving countries in international mathematics achievement tests. Recently, in another study Simpson and Linder (2014) found out that few of the professional development received by pre-service and in-service early childhood educators in an Southeastern state in USA working with children aged birth to age five only focus on specific mathematical content area or CCSSM. That is to say, professional development of pre-service and in-service educators in mathematics is inadequate based on mathematical content area and CCSSM. In a study, Purpura and Lonigan (2015) developed a preschool early numeracy scale focusing on one to one counting, cardinality, counting subsets, subitizing, number comparison, set comparison, number order, numeral identification, set-to-numerals, story problems, number combinations, and verbal counting which are the skills and concepts identified by NCTM (2006), National Mathematics Advisory Panel (2008) as well as CCSSM (2010) with preschool children ages 3 to 5 years old. They found out that the scale they constructed is reliable and valid as well as easy to use for measuring the effects of targeted instruction on individual numeracy skills. Existing literature indicates lack of research on mathematics education in kindergarten level and a research is necessary especially in Turkey when early childhood education curriculum is recently updated. Besides, in Turkey studies about curriculum and its objectives are in science (e.g. Kapucu and Yıldırım 2013), in mathematics (e.g. Keleş, Haser and Koç 2012) or in other basic sciences (e.g. Yapıcı and Demirdelen 2014). TECEC

related studies are relatively less. For instance, some researchers (Özsırkıntı, Akay, and Yılmaz Bolat 2014; Köksal, Balaban Dağal, and Duman 2016) only in some part of their studies investigated early childhood curriculum under objective dimension. But in these studies they did not make any comparison between TECEC and other international curriculum. Comparison of TECEC with international curriculum would contribute enriching TECEC, giving feedback to policymakers about TECEC, and also understanding the situation in early childhood education with respect to USA. Besides, results based on similarities and differences found in these curricula would contribute to current literature as well as preschool teachers' mathematics teaching practices in their classrooms.

The aim of this present study is to compare Turkish Early Childhood Education Curriculum objectives related to mathematics with respect to kindergarten level Common Core State Standards for Mathematics. In this process, the following research questions are answered: (1) Do the objectives related to mathematics in Turkish Early Childhood Education Curriculum differ in kindergarten level in CCSSM? and (2) How do the mathematical expectations from kindergarten students differ in these two documents?

Method

In the present study, document analysis as a qualitative research technique is applied. Document analysis involves analysis of written documents based on targeted purpose fact or facts (Yıldırım and Şimşek 2006). In this study, mathematics related objectives in TECEC are compared with respect to CCSSM for kindergarten level. At first objectives in TECEC are classified according to five domains of CCSSM. Then, similarities and differences of objectives with respect to standards of CCSSM are determined. Two of the main documents in the present study are Turkish Early Childhood Education Curriculum and Common Core State Standards for Mathematics. The general issues of two main documents "TECEC" and "CCSSM" are presented in the following paragraphs, respectively.

Mathematical concepts and skills in Turkish Early Childhood Education Curriculum are presented under cognitive development skills. Among these cognitive development skills, there are 21 objectives. Under these objectives, there are 11 development characteristics defined for 36-48 months old children, 20 development characteristics for 48-60 months old children, and 22 development characteristics for 60-72 months old children. Five of the objectives under cognitive development skills were eliminated from analysis, because they are not related to mathematical concepts and skills. Eliminated objectives are; children will be able to (1) pay close attention to object / situation / event, (2) remember what s/he perceives, (3) observe objects or creatures, (4) recognize symbols used in daily life, and (5) recognize Atatürk and explain his significance for Turkish society. The rest of the objectives (16 objectives) are taken into consideration for the present study. Mathematical related objectives involve estimation, number and counting, matching, grouping, comparing, sorting, spatial sense, measuring, geometrical shapes, patterns, part-whole relation, addition and subtraction, cause-effect relation, time, problem solving, and graphics like mathematical concepts or skills.

About CCSSM, there are standards for mathematical practice which describe varieties of expertise students should have. These practices cover making sense of problems and persevering in solving them, reasoning abstractly and quantitatively, constructing viable arguments and critiquing the reasoning of others, modelling with mathematics, using appropriate tools strategically, attending to precision, looking for and making us of structure and lastly, looking for and expressing regularity in

repeated reasoning (CCSS 2012). Mathematics in kindergarten focuses on two critical areas; whole numbers and shapes and space. But more learning time is devoted to numbers. Within CCSSM, counting and cardinality, operations and algebraic thinking, number and operations in base ten, measurement and data, and geometry are the five domains defined.

To compare TECEC with respect to CCSSM, five domains defined under CCSSM are used. Since mathematics related objectives in TECEC aren't categorized in itself and just presented under cognitive development skills. Each objective in TECEC is compared according to each standard represented under these domains. While comparing objectives in TECEC and standards in CCSSM, the researcher considered if these objectives and standards aiming the same results in children. The analysis is qualitative, aiming to categorize the objectives in two main documents used. Categories are chosen as the domains in CCSSM.

Internal validity is also concerned in the study. The results found were sent to an expert, who had experience in mathematics education and qualitative research, for carrying out member check. After his comments, the results took their final form. Expert's comments were about some of the objectives were related with two standards. Both the researcher and expert agreed on these comments and findings took their final forms. In the following sections, under these domains each standard and objective are described.

Results

In this part, the results are presented under six different titles. First five of the titles are determined according to five domains in CCSSM and the last domain is chosen as uncategorized objectives in TECEC with respect to CCSSM. Throughout the results section, in tables italic sentences are objectives in TECEC or standards in CCSSM. Moreover, indicators of objectives and descriptions of standards are written with normal font.

Counting and Cardinality

In CCSSM under counting and cardinality domain there are three standards defined. And these standards have descriptions under them. In addition to this, in TECEC about this domain there are four objectives. Each objective has their indicators under them. Analysis of TECEC with respect to CCSSM is shown in the following Table 1.

Table 1.
Analysis of TECEC with respect to CCSSM under Counting and Cardinality Domain

	TECEC objectives and indicators			
	• *Count objects*	• *Compare the characteristics of objects and creatures*	• *Sort the characteristics of objects and creatures*	• *Match the objects or creatures according to their characteristics*
CCSSM standards and a cluster of descriptions				
• *Know number names and the count sequence*				
- Count to 100 by ones and by tens.	- Count forward and backwards one by one.*			
- Count forward beginning from a given number within the	- Count forward and backwards			

	known sequence (instead of having to begin at 1).	one by one.*		
-	Write numbers from 0 to 20. Represent a number of objects with a written numeral 0-20 (with 0 representing a count of no objects).			
•	*Count to tell the number of objects*			
-	Understand the relationship between numbers and quantities; connect counting to cardinality.	- Tell the ordinal number.*		- Match object / creature one to one.* - Distinguish and match objects / creatures according to color, shape, size, length, tissue, voice, material it is produced, taste, smell, quantity and intended use.*
** When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object.		- Tell the ordinal number.*		- Match object / creature one to one.* - Distinguish and match objects / creatures according to color, shape, size, length, tissue, voice, material it is produced, taste, smell, quantity and intended use.*
** Understand that the last number name said tells the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted.		- Tell the number of objects counted.*		
** Understand that each successive number name refers to a quantity that is one larger.		- Tell the number which is previous or next to stated one which is up to ten.		
-	Count to answer "how many?" questions about as many as 20 things arranged in a line, a rectangular array, or a circle, or as many as 10 things in a scattered configuration; given a number from 1–20, count out that many objects.	- Tell the number of objects counted.* - Show a set of objects in stated number.		
•	*Compare numbers*			
-	Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, e.g., by using matching and counting strategies.		- Distinguish and compare object's / creature's color, shape, size, length, tissue, voice, smell, material it is produced, taste, quantity, and intended use.	- Sort object's and creature's length, size, quantity, weight, color.	- Show equal object / creatures. - Match object / creature with its shade or drawing
-	Compare two numbers between 1 and 10 presented as written numerals.			

**compared twice*

When Table 1 is analyzed, it is seen that expectations from children have both similarities and differences. Beginning from the first standard in CCSSM, it includes counting to 100 by ones and tens, and counting by beginning at any given number, but in TECEC about counting issue it is limited with counting forward and backwards one by one. About counting to tell the number of

objects standard in CCSSM, saying the number names in standard order, pairing each object with one and only one number name and each number name with one and only one object are emphasized in one of its descriptions. About this description, in TECEC the ordinal number issue, matching one by one, and matching or distinguishing with respect to different issues are mentioned. Another description of the same standard mentions understanding the last number said tells the number of objects counted regardless of their arrangement. TECEC covers telling the number of objects counted as an indicator of "counting objects" objective. One another description in CCSSM is to understand that each successive number name refers to a quantity that is one larger. Similar to this description, an indicator in TECEC is telling the number which is previous or next to stated one which is up to ten. Counting to answer "how many?" questions is also stated in CCSSM and it has a similar indicator in TECEC which is showing a set of objects in stated number. Comparing numbers is the last standard about counting and cardinality domain in CCSSM. Under this standard there is a description which is identifying whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group. When this description is compared with the indicators in TECEC, it has three objectives related with the description mentioned. These three objectives cover distinguishing and comparing, sorting, and object's / creature's different characteristics, showing equal object / creature, and matching object / creature with its shade or drawing as seen in Table 1 above.

Operations and Algebraic Thinking

Like the counting and cardinality domain, operations and algebraic thinking domain is also about understanding and using numbers. CCSSM document covers only one standard and it has five descriptions. In TECEC, meanwhile, there are three objectives and these have indicators mentioned under it.

Table 2.
Analysis of TECEC with respect to CCSSM under Operations and Algebraic Thinking Domain

	TECEC objectives and indicators			
	• *Do simple addition and subtraction operations by using objects.*	• *Group objects / creatures according to their characteristics.*	• *Constitute a pattern with objects*	• *Find a solution for problem situations*
CCSSM standards and a cluster of descriptions				
• *Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.*				
- Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.	- Add stated number of objects to object set. - Subtract stated number of objects from object set.			
- Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.				- Suggest various solutions to problems. - Try the solution s/he chooses.
- Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each		- Group object / creature according to their color,		

	decomposition by a drawing or equation (e.g., 5 = 2 + 3 and 5 = 4 + 1).	shape, size, length, tissue, voice, material it is produced, taste, smell, quantity and intended use.		
-	For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing or equation.			
-	Fluently add and subtract within 5.			
			- Constitute a pattern with objects according to a given model. - Tell the rule of a pattern that is constituted of three elements. - Tell and complete the missing element in a pattern. - Constitute an original pattern with objects.	
				- Tell the problems. - Choose one among the solutions. - Tell the reason of why s/he chooses one of the solutions among others - Choose another solution when s/he couldn't reach a solution. - Suggest creative solutions to problem situations.

Understanding addition as putting together and adding to, and understanding subtraction as taking apart and taking from is the only standard under operations and algebraic thinking domain in CCSSM. One of the descriptions of this standard is representing addition and subtraction with different ways, also in TECEC there are two indicators mentioned under doing simple addition and subtraction operations by using objects. These indicators are adding stated number of objects to object set and subtracting stated number of objects from object set, and they are related to the description in CCSSM. But still one of the descriptions of CCSSM under operations and algebraic thinking domain "Solve addition and subtraction word problems, and add and subtract within 10" is related with "finding a solution for problem situation" objective. Likewise, one of the descriptions of CCSSM under operations and algebraic thinking domain is "Solve addition and subtraction word problems, and add and subtract within 10" is related with "finding a solution for problem situation" objective and its indicators "Suggest various solutions to problems" and "Try the solution s/he chooses". Decomposing numbers less than or equal to 10 into pairs in more than one way is another description mentioned in CCSSM and one of the indicators under grouping objects / creatures according to their characteristics, grouping object / creature according to different characteristics, is related with the description mentioned in CCSSM.

Constituting a pattern with objects is another objective emphasized in TECEC. It has four indicators. They range from constituting a pattern from a given model to constituting an original pattern with objects. However, there is not any standard or description in CCSSM about patterns.

Number and Operations in Base Ten

About this issue, in CCSSM only one standard is defined and it includes composing and decomposing numbers from 11 to 19. Analysis of TECEC with respect to CCSSM is presented.

Table 3.
Analysis of TECEC with respect to CCSSM under Number and Operations in Base Ten Domain

	TECEC objectives and indicators
	• -
CCSSM standards and a cluster of descriptions	
• *Work with numbers 11–19 to gain foundations for place value.*	--
- Compose and decompose numbers from 11 to 19 into ten ones and some further ones, e.g., by using objects or drawings, and record each composition or decomposition by a drawing or equation (e.g., 18 = 10 + 8); understand that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.	--

When the standard in CCSSM is analyzed, children are tried to gain foundations for place value by composing and decomposing them. On the other hand, TECEC objectives and indicators don't address place value.

Measurement and Data

This domain is significant for children to look for and understand the relationships in the real world about length, height, weight, and time issues. Both TECEC objectives and CCSSM standards have related standards and objectives about these issues.

Table 4.
Analysis of TECEC with respect to CCSSM under Measurement and Data Domain

	TECEC objectives and indicators		
	• *Measure objects.*	• *Prepare graphics with objects / symbols*	• *Clarify the concepts related with time.*
CCSSM standards and a cluster of descriptions			
• *Describe and compare measurable attributes.*			
- Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.			
- Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. For example, directly compare the heights of two children and describe one child as taller/shorter.	- Measure with nonstandard units.		
• *Classify objects and count the number of objects in each category.*			
- Classify objects into given categories; count the numbers of objects in each category and sort the categories by count.		- Constitute graphics with objects. - Constitute graphics with symbols that represent objects. - Count objects or	

		symbols that constitute graphics. - Draw a conclusion from the graphic examined.	
	- Estimate the result of measurement. - Compare measurement results with estimated ones. - Tell standard measurement tools.		
			- Sort the events according to being time. - Clarify time concepts according to their meanings. - Clarify the functions of tools that have time related meanings.

When Table 4 is analyzed, there are two standards mentioned in measurement and data domain in CCSSM. Under describing and comparing measurable attributes standard, there is a description; directly comparing two objects with a measurable attribute in common. It is related with measuring with nonstandard units indicator. Second standard is classifying objects and counting the number of objects in each category, and under it there is only one description about classifying objects into given categories and counting the numbers of objects in each category and sorting the categories by count. This description is parallel to the indicators of preparing graphics with objects / symbols objective. These indicators are as shown in Table 4 constituting graphics with objects, constituting graphics with symbols that represent objects, and lastly counting objects or symbols that constitute graphics. Clarifying the concepts related with time is an objective in TECEC and it covers three indicators. However, CCSSM standards do not include time related standards or descriptions.

Geometry

Geometry is the last domain addressed in this study. The similarities and differences in each document are shared in the following Table 5.

Table 5.
Analysis of TECEC with respect to CCSSM under Geometry Domain

	TECEC objectives and indicators		
	• *Identify geometric shapes*	• *Apply instructions related with position in space (spatial sense)*	• *Comprehend part-whole relationship*
CCSSM standards and a cluster of descriptions			
• *Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres).*			
- Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as above, below, beside, in front of, behind, and next to.	-Tell the name of geometric shape shown	- Tell the object's position in space. - Place the object appropriately according to given instruction. - Take position in space.	
- Correctly name shapes regardless of their orientations or overall size.			
- Identify shapes as two-dimensional (lying in a plane, "flat") or three			

	dimensional ("solid").			
•	*Analyze, compare, create, and compose shapes.*			
-	Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having sides of equal length).	- Tell the characteristics of geometric shapes		
-	Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.	- Show objects which are similar to stated geometric shape.		
-	Compose simple shapes to form larger shapes. For example, "Can you join these two triangles with full sides touching to make a rectangle?"		- Tell the parts of a whole. - Associate parts to make a whole.	
		- Use map and sketch.		
			- Show what a whole and a part are. - Divide a whole into pieces.	

Under geometry domain there are two standards in CCSSM. One of the descriptions is correctly naming shapes regardless of their orientations or overall size. There is a similar indicator under identifying geometric shapes which is telling the name of geometric shape shown. Another similarity is seen between analyzing and comparing two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts and other attributes in CCSSM and telling the characteristics of geometric shapes in TECEC. Another description in CCSSM is modelling shapes in the world by building shapes from components and drawing shapes. Similar to this description, there is an indicator in TECEC; showing objects which are similar to stated geometric shape. Applying instructions related with position in space (spatial sense) is another objective in TECEC. Under this objective there are three indicators "telling the object's position in space", "placing the object appropriately according to given instruction", and lastly "taking position in space" which are similar to the description in CCSSM. This description is describing objects in the environment using names of shapes, and describing the relative positions of these objects. The last objective is "comprehending part-whole relationship" about geometry domain. Two of the indicators of this objective are telling the parts of a whole and associating parts to make a whole. The last standard under this domain is analyzing, comparing, creating, and composing shapes. One of the descriptions of this standard is composing simple shapes to form larger shapes this description is similar to these two indicators.

Uncategorized Objectives and Their Indicators in TECEC according to CCSSM

Table 6 presents two objectives of TECEC which are not covered in CCSSM. These objectives also are not belonging to any of domains mentioned above. These objectives as seen in Table 6 are about prediction and cause-effect relation skills.

Table 6.
Uncategorized Objectives

Objectives	Indicators
• *Make a prediction about object / situation / event*	--
• *Establish a cause-effect relation.*	- Tell the possible reasons of an event. - Tell the possible results of an event.

Until uncategorized objectives section, none of the CCSSM standards or descriptions expresses specifically the prediction and cause-effect relation skills related objectives in TECEC. Therefore, these objectives are given under uncategorized objectives.

Discussion and Conclusion

The aim of this study was to compare TECEC objectives related to mathematics with respect to kindergarten level CCSSM. For reaching this aim, if there were differences between the mathematics related objectives of TECEC and CCSSM and how they differ were analyzed. In general, the findings of the study showed that CCSSM and TECEC had both similarities and differences.

Counting and cardinality is the first domain in which TECEC is compared with respect to CCSSM. Children can see counting and cardinality as separate and different situations at first (Fuson and Hall 1983). Counting is about the action of finding the number of elements of a finite set of objects, cardinality means the measure of the number of elements of a set. Children's understanding of the last counted word is about cardinal principle as stated by Gelman and Gallistel (1978). When the results of counting and cardinality domain are analyzed, CCSSM has more detailed standards and descriptions than TECEC objectives and indicators. This might contribute to seeing that CCSSM dedicate more time to number than to other topics as also mentioned in it (CCSS 2012). In other respects, TECEC covers mathematical skills like comparing, sorting, matching, and classifying separately but in CCSSM these skills are embedded in descriptions of standards. These mathematical skills also form a basis for logical mathematical knowledge (Copeland 1984). As Copeland (1984) mentioned logical mathematical knowledge is interested in constructing mathematical relations which is an early basis for mathematical thinking. Comparing, sorting, and matching as well as classifying are significant mathematical skills in learning mathematical relations and also early mathematical thinking. Informal learning about these skills is gained during preschool years and teachers might become aware of the significance of them with early childhood curriculum. Therefore, including these skills separately to Turkish early childhood curriculum or embedding them in descriptions of standards of CCSSM is an advantage for preschoolers. As a result, this would help teachers in preparing mathematical activities appropriate to their children's developmental level.

Patterning is fundamental to mathematics (Baroody and Coslick 2000). Besides, patterns are buildings blocks of generalization and generalization is building block of algebra (Tanışlı and Özdaş 2009). When the results about operations and algebraic thinking process domain are analyzed, CCSSM has detailed standards and descriptions about addition and subtraction operations. Though patterns are significant in algebraic thinking (Hawker and Cowley 1997; NCTM 2000; Steele 2005), these were not mentioned in CCSSM. But, TECEC covers this topic and describes patterns in its indicators in detail. Although CCSSM do not include patterns, various studies (Mulligan and Mitchelmore 2009; Rittle-Johnson, Fyfe, Loehr, and Miller 2015) discuss how significant it is in early childhood education and how it affects algebraic thinking. As is known, skills like identifying, continuing patterns, finding out the rule for getting the next step, and stating a rule both verbally and symbolically direct children to algebraic thinking (Palabıyık and Akkuş İspir 2011). Furthermore, number system has patterns due to its nature and looking for a pattern is a form of logical way of problem solving (Sperry Smith 2013). As well, children like working with patterns and are generally successful at patterns when they discover repeating unit in patterns (Papic, Mulligan, and Mitchelmore 2011). Therefore, patterns should be taken into consideration in early childhood education. This could be thought as an advantage for TECEC.

Another issue is place value. The value of the place a digit occupies is defined as place value. Well understanding of place value will constitute a base for operations with numbers and right calculations (Haylock and Cockburn 2013). Nevertheless, many studies found out that it was too difficult for young children (Carpenter, Franke, Jacobs, Fennema, and Empson 1998; Fuson and Briars 1990). CCSSM cover place value and its standard mentions that students can compose and decompose numbers from 11 to 19 into ten ones and some further ones. This can be thought as an advantage for young children. For instance, Laski, Vasilyeva and Schiffman (2016) found that children who used canonical base – 10 representation in kindergarten and first grade would perform more accurately on place value problems two years later. Besides, Moeller, Pixner, Zuber, Kaufmann, and Nuerk (2011) mentioned that early place value understanding was a reliable predictor for specific aspects of arithmetic performance. Young children willing attempt to write multi digit numbers before explicit instruction about place value (Byrge, Smith, and Mix 2014). Besides, in their study expanded number writing of 5 and 6 years old supported the idea that it is the typical first approach to understand place value (Byrge, Smith, and Mix 2014). TECEC objectives and indicators notwithstanding do not address place value. Place value is covered later in primary school in Turkey. Not including place value in TECEC can be thought both as an advantage and as a disadvantage. It can be seen as an advantage since TECEC do not cover detailed counting and cardinality objectives and indicators as in CCSSM. Moreover, it can be seen as a disadvantage due to its benefits in further years as found in Laski, Vasilyeva and Schifman's (2016) study.

Measurement is about physical properties like height, weight, and volume and also is about not physical properties like time, temperature, money, etc. (Sperry Smith 2013). During preschool years children develop their knowledge about measurement. Under measurement and data domain, CCSSM standards are limited to height and weight or any measurable difference. On the other hand, TECEC covers graphics and time related objectives and indicators in addition to height, weight and other measurable differences. Therefore, TECEC has more expectations from children than CCSSM about this domain.

Geometry and spatial sense are also important areas of mathematics for young children. During preschool years children have chance to explore and learn more about geometrical and spatial sense related concepts, especially in their everyday experiences while moving in the environment and interacting with objects around them as Clements, Swaminathan, Hannibal and Sarama (1999) mentioned. Geometry domain is the last one that comparison is done between CCSSM and TECEC. Under this domain there are more similarities in two documents. Both TECEC and CCSSM concentrate on describing positions of objects, naming shapes, features of shapes, and modelling shapes or showing objects similar to the geometric shape told. On the other hand, CCSSM has differences with respect to TECEC and it also takes into concentration two and three dimensional shapes and correctly naming shapes regardless of orientation or overall size. These differences give children chances to experience and understand geometrical shapes.

There are also uncategorized objectives of TECEC with respect to CCSSM; prediction and cause-effect relation related objectives. Prediction is not random issue, the quality of prediction lies on the quality of mathematics somebody has (Olkun and Toluk Uçar 2009). Likewise, cause-effect relation is also significant in reaching a solution. Both skills are gained during early years (Olkun and Toluk Uçar 2009). Therefore, including these skills in TECEC would also be seen as an advantage.

In the study, TECEC and CCSSM were analyzed; this could be thought as a limitation for the study and may decrease the value of interpretation. To eliminate this, in further studies different countries' curriculum can also be included and compared. Although it has a limitation, this study is thought to

have a valuable contribution to the early childhood mathematics education, especially in enriching curriculum. Another limitation of this study is comparison done is just based on mathematics related objectives in TECEC and standards in CCSSM. In further studies, comparison could also be done based on other dimensions of curriculum like assessment and evaluation dimension, teachers' role, students' role in teaching and learning process, etc.

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