

The Examination of the Relation Between the Boehm Test of Basic Concepts (Boehm-3) and Bracken Basic Concept Scale (BBCS) for Preschoolers

Gülden Uyanık Balat*

ABSTRACT. This study has been conducted on preschoolers attending the preschool year of a middle class primary school affiliated to the Ministry of National Education. 34 children participated in the study. The mean age of participants was 64.8 months, with the standard deviation of 3.5 months. The families of the participating children were sent information forms designed by the researcher with the aim of identifying children's descriptive characteristics. The children were given the Boehm Test of Basic Concepts and the Bracken Basic Concept Scale in order for their correlations to be examined. In addition, the correlation between the quantity, time and direction/position subtests of the Bracken Basic Concept Scale and the quantity, time and space concept scores of the Boehm Basic Concept Test was determined. The results showed a meaningful correlation between the Boehm Test of Basic Concepts (Boehm-3) and Bracken Basic Concept Scale (1984) ($r = .76$).

Key words: Preschoolers, Basic concepts, Boehm-3, BBCS.

INTRODUCTION

Children are known to move through four basic processes of concept development: grouping, generalization, classifying and concept learning. Concept learning requires an interaction between distinguishing and generalization. The former starts immediately after birth when babies start to distinguish certain things. Making generalizations, on the other hand, is a possibility for children above a certain age. According to Piaget, the manipulation of objects during games prepares the conditions needed for concept learning in little children. The number of concepts mastered by children increases during the first few years of childhood. Feedback from game materials and other children enable them to test their hypotheses and extend their conceptual repertoire (Akman, 1995).

Vygotsky was of the opinion that children's concepts were basically different from those of adults. According to him, the concepts of little children were based on specific examples and experiences. He defined three stages in concept development. The first one of these was the "unorganized heaps" stage, which is when the child solves problems by placing items in unorganized heaps. "At this stage, word meaning denotes nothing more to the child than a vague syncretic conglomeration of individual objects that have somehow or other coalesced into an image in his mind" (Vygotsky, 1962). The second stage is shaped by "thinking in complexes". In this phase, objects are brought together in the child's mind not only with his subjective impressions but also with bonds actually existing between them. Far from being abstract and logical, these links are concrete and factual, and are acquired directly through experiences. The third stage is the "conceptual thinking" stage. This phase includes characteristics not included by the previous ones: abstract and logical thought. In this stage, single principles or logically unified sets of principles form the basis of conceptual structure. Grouping objects according to their similarities replaces grouping them according to one single characteristic (Keil, 1989; qtd. in Aral, Bütün Ayhan, 2005).

According to Solomon et al (1999), concepts are the stepping stones of the mind. Their formation, use and growth are therefore major issues in cognitive development. Children acquire concepts through active participation. Learning experiences may be grouped into three as natural, where selection and action are controlled by the child; unstructured, where the child selects and starts an action but is intruded on by an adult at certain times; and structured, where experiences are selected by adults and instructions are given to children about when or how to start an action. According to Piaget, children internalize knowledge through such interaction with the environment (Charlesworth and Rodeloff, 1991).

Basic concepts are often used to define people's or objects' qualities, positions, time and numbers. They are also necessary for children to understand school activities, which makes them critical to school success. Previous research has shown that many concepts are actually learned before

children start school, i.e. in the preschool years. Studies have also shown that children with learning difficulties tend to face more difficulties when learning basic concepts and that insufficient learning experiences during the preschool years may lead to differences in conceptual development in later years. Boehm (2001) emphasizes the importance of exposing children to activities geared towards minimizing the differences in concept learning and linguistic development.

Research has shown that many concepts are learned during the preschool years (Clark, 1983; de Villiers and de Villiers, 1978; French and Nelson, 1985; qtd. in Boehm, 2001). In these years, children gradually learn basic concepts such as *both*, *other* and *before*. These basic concepts play an important role in understanding course content and materials in the first grade. For instance, the teacher may ask pupils to open *both*, find the *other* ball or wash their hands *before* eating. The assessment of children's mastery of basic concepts is often done through certain tests. In Turkey, for instance, the Boehm Test of Basic Concepts (BTBC) and the Bracken Basic Concept Scale (BBCS) are commonly used in the evaluation of children's knowledge of basic concepts. BBCS has been correlated to several other tests. McIntosh, Wayland and Barnes (1995) reported a strong association ($r = .80$) between the BBCS Total Test score and the DAS General Conceptual Ability (GCA) score. Likewise, a correlation of .91 was found between the Bracken Basic Concept Scale and Stanford-Binet Intelligence Scale: Fourth Edition (SB-IV), (Kuehn-Howell, Bracken 1992). Ryhner and Bracken (1988) showed low to moderate correlations between standard scores from the Bracken Basic Concept Scale, the auditory comprehension and verbal ability subscales of the Preschool Language Scale, and the Slossen Intelligence Test.

Stainbauer and Heller (2006) gave preschoolers the Boehm Test of Basic Concepts and the Stanford Achievement Test, Form W. The scores obtained in each subject area by the Stanford were then correlated with those of the Boehm Test. The resulting coefficients suggested a strong correlation between deficiencies in early concept learning as tested by the Boehm Test of Basic Concepts and academic success in the second and third grades. These results indicated the Boehm Test of Basic Concepts as an early predictor of school success. Boehm (2001) examined the validity of Boehm-3 with four different tests. She found correlations between Boehm-R (.61 to .96), Metropolitan Achievement Test (.58 to .88), Metropolitan Readiness Test-sixth edition (.48 to .63) and Otis-Lennon School Ability test- Seventh Edition (.45 to .68). Sarachan-Deily et al (1983) observed that among kindergarten children, the Concept subtest of the DIAL was found to be highly correlated with the BTBC, indicating the evaluation of similar abilities. Beech (1981), on the other hand, investigated the concurrent validity of the Boehm Test of Basic Concepts (BTBC) by comparing it to two tests of linguistic abilities (TACL and CELI) and five tests of cognitive abilities (Piagetian tasks). While the strongest correlation of the BTBC was with the test of receptive language, correlations with Piagetian tests were found to be moderate. It was thus concluded that the BTBC could be used as a general estimate of cognitive ability.

The present study investigated the correlation between the Bracken Basic Concept Scale and Boehm-3 for Turkish children.

METHOD

Sample

The participants were chosen randomly from among a total of 94 children attending the preschool year of a primary school affiliated to the Ministry of National Education. A total of 34 children, 17 girls and 17 boys, participated in the study. The average age of children was 64.8 months, with a standard deviation of 3.5 months. Twenty-four of the children had not received preschool education formerly, 6 had been in preschool for one year, 2 had been in preschool for two years and the remaining 2 for three years. Twelve participants were single children, 19 had one sibling, 1 had two siblings and 2 had three siblings. Seventeen children were first-born, 15 were second-born, 1 was third-born and 1 fourth-born. An examination of parents' educational status showed that 5 mothers were primary school graduates, 4 were secondary school graduates, 17 were high school graduates, 6 were university graduates, and 2 held graduate degrees. Six fathers, on the other hand, were primary school graduates, 3 were secondary school graduates, 17 were high school graduates, 11 were university graduates, and 3 held university degrees. The scales were implemented on children one by one in an unstimulating room.

Boehm Test of Basic Concepts (Boehm-3,2000)

Boehm Test of Basic Concepts (version year 2000) was developed by Ann E. Boehm. The test can be applied to children attending kindergarten and second grade. The test consists of a small booklet including 50 basic concepts, and its aim is to evaluate the children's ability levels on qualitative, environmental and characteristics of some concepts. Applications were carried out individually. Each child was presented with the test material, directions were given, and they were asked to choose the correct picture. Every correct answer is marked as "1" and every wrong answer as "0" (Boehm,2000). Boehm-3 has two parallel forms: Forms E and F. The current study employed the former. The tests were administered in one session. Boehm-3 results may be reported in raw scores, percent correct, performance ranges and percentiles. In this study, we used raw and sub-test raw scores. The validity of the E form of the test for first grade Turkish children (2002), and test retest reliability were calculated to be .879 (ICC) and Cronbach Alfa .8626. Spearman-Brown reliability was calculated as .8290 (Uyanık-Balat, 2003).

Bracken Basic Concept Scale (BBCS)

The Bracken Basic Concept Scale was used to evaluate the concept development of children aged between 2.6 and 8. The scale has 11 sub-tests which cover the recognition of colour, letter, number/counting, comparison, shape, direction/position, social/emotional concepts, size, texture and material, quantity and time. Each child starts BBCS from the first item of each of the first five sub-tests and continues with these sub-tests until s/he fails consecutively in three items. The score obtained by children on these five subtests is used to estimate the initial level of success that the child will display in each of the remaining sub-tests. The starting items of the tests that range between 6 to 11 are lettered from A to K. The child gets one point for every correct answer on each of the subtests. Every correct answer is marked as "1" and every wrong answer as "0" (Bracken, 1984). Since the letter "w" does not exist in the Turkish alphabet, the letter "v" was used instead in the letter recognition test. Likewise The Turkish currency unit of YTL was used in the questions related with the concept of money in the sub-test on quantity.

FINDINGS

As shown in Table 1, the correlation between the results of the Boehm Test of Basic Concepts (Boehm-3) and Bracken Basic Concept Scale is meaningful ($p < .0001$), thereby showing that both tests may be used to assess the basic concept knowledge of preschoolers. Similarly, Boehm (2001b) found that the correlation between Boehm-3 Preschool and Bracken Basic Concept Scale-Revised was .80 for 3-year-olds and .73 for 5-year olds. It may be inferred from these results that both tests measure many of the same aspects of the constructs of basic concepts.

Table 1.
Pearson's Correlation between the Boehm Test of Basic Concepts and Bracken Basic Concept Scale

Boehm Test of Basic Concepts (BTBC-3)	Bracken Basic Concept Scale (BBCS)
	$r = .756, p = .0001$

Table 2.

Pearson's Correlation between the space, quantity and time concepts of the Boehm Test of Basic Concepts and the direction-position quantity and time subtests of the Bracken Basic Concept Scale

Boehm Test of Basic Concepts (BTBC)/ Bracken Basic Concept Scale (BBCS)	BTBC-Space	BTBC-Quantity	BTBC-Time	BBCS-Direction-Position	BBCS-Quantity	BBCS-Time
BTBC- Space	-					
BTBC- Quantity	0.583***	-				
BTBC- Time	0.735***	0.716***	-			
BBCS- Direction-Position	0.552***	0.672***	0.201	-		
BBCS- Quantity	0.513**	0.680***	0.287	0.746***	-	
BBCS- Time	0.437*	0.656***	0.421*	0.632***	0.748***	-

*** $p < 0.0001$, ** $p < 0.001$, * $p < 0.05$ (2- tailed)

The Boehm Test of Basic Concepts and the subtests of Bracken Basic Concept Scale were investigated and a positive meaningful correlation varying between .421 and .746 was found. The only instance where a meaningful correlation did not exist was between the time concept of the Boehm Test of Basic Concepts and the direction-position and quantity subtests of the Bracken Basic Concept Scale. However, a meaningful correlation at the level of .421 was found between the time concept of the two tests.

DISCUSSION

The American National Research Council (2000) has identified three principles of learning based on research and they recommend these to be incorporated into school curricula:

* The ideas and concepts that help children make sense of their environment develop at a very young age. Children, however, are not empty vessels to be filled with new information; rather, they build on their existing understandings. Learning is thus most effective when their preconceptions are engaged. School curricula should build on children's existing ideas.

* Expertise is not gained solely through factual knowledge and skills. More than these, it needs a conceptual understanding to turn these facts and skills into "usable" knowledge. In mathematics, for example, children need to develop more than just verbal counting skills and number recognition; they need to grasp "quantity." Similarly, emergent literacy requires more than the mere recognition of letters. It requires an understanding of the concept of "representation" involved in written words and illustrations. As the preschool years are a time when children are rapidly developing skills and acquiring new knowledge, the importance of concepts may be overlooked. Curricula should promote learning of concepts in addition to information and skills.

* Children can be taught to monitor their thinking in the form of learning strategies. These "metacognitive skills" are naturally used by some children but curricula should incorporate efforts to ensure that all children learn these skills deliberately.

In a similar vein to the American National Research Council, Ginsburg et al (1999) stated that preschool curricula should have activities that include the following basic concepts or ideas of mathematics:

- *Numbers*; counting and meaning of numbers
- *Shapes*, identifying and constructing 2 and 3 dimensional shapes; understanding their properties
- *Putting together and taking apart*; promoting exploration of adding and subtracting, and relations between sets and subsets
- *Spatial relations*; exploring relations such as in front of, behind, above, below, left-right which are important to navigation
- *Measurement*; exploring quantity and physical attributes such as length, weight, temperature and money
- *Patterns and predictions*; introducing patterns such as shapes, numbers, and sounds and encouraging children to detect patterns for prediction.

These give us an idea of an optimal preschool curriculum. In Turkey, a preschool curriculum has been designed by the Ministry of National Education's General Directorate of Preschool Education. Aimed at 36-72 month old children, this curriculum includes objectives and attainments and is implemented by teachers who prepare annual and daily plans. The overall aim of this integrative curriculum is to meet the pre-specified objectives and attainments throughout the preschool years. In addition to the objectives, the General Directorate of Preschool Education has also prepared a list of concepts that children should learn. The list includes but is not limited to the basic relational concepts of numbers, colors, shapes, inside-outside, yesterday-today-tomorrow, half-whole, even-odd, same-different-similar, and less-more.

Preschool curricula have many aims, one of which is to prepare children for primary education. Appropriate assessment tools must be used to see how many of these concepts are attained by children and whether they are able to learn these concepts which are needed in primary school. Both Bracken Basic Concept Scale and Boehm Test of Basic Concepts are commonly used by researchers in Turkey with the aim of assessing the conceptual knowledge of children.

Akman (1995), for instance, investigated the concept development of 40-69 month old preschoolers with the aim of examining the effects of concept training. Using the Bracken Basic Concept Scale, this study concluded that the training meaningfully contributed to the concept development of children. Akman, İpek and Uzun (1999) studied the concept development of six-year old children in two different schools following two different curricula, and found no meaningful difference. In another study, Akman, İpek and Uyanık (2000) used BBCS to assess the concept development of preschoolers and reported a meaningful relationship between the subtests with respect to children's scores. In yet another study, Akman, Uyanık and Uzun (2000) found a meaningful difference between the concept development of six year-olds living with their families and in foster homes.

Arı et al (2000) assessed the concept development of four to six-year-olds with BBCS and found a difference between the concept development of children who received preschool education and those who did not. Studies conducted by Uyanık Balat (2003) and Uyanık Balat & Artan (2004) by using BTBC-3 assessed the concept knowledge of 513 children with respect to the variables of living in a foster home versus living with their family, gender, socio-economic level, and parents' education level. They found a meaningful difference between the basic relational concept scores of children from different socio-economic backgrounds.

In a different study, Uyanık-Balat and Güven (2006) studied the concept development of first and second-graders with respect to having received preschool education or not and living with their family or in a foster home, and found a meaningful relationship between the duration of preschool education and children's concept scores. In the same study, while no meaningful difference was found between the concept scores of first graders living in a foster home and with their family, the difference was meaningful in the second grade.

Üstün and Akman (2003) used BBCS to assess the concept development of three-year-old children who were and were not receiving preschool education and reported a meaningful difference between groups. Uğurtay-Üstünel (2007) conducted the validity and reliability studies of the Bracken Bracken Basic Concept Scale – revised version for use with Turkish children.

As shown through these studies, both Boehm Test of Basic Concepts and Bracken Basic Concept Scale are commonly used in studies on the concept development of Turkish children. This

study does not aim to suggest that these two tests should be used interchangeably. Indeed, when asked the main difference between his test and the Boehm Test of Basic Concepts in an interview, Bracken (2003) replied that his test could be implemented individually, assessed more than 300 basic concepts in eleven subtests, and could be used for scanning, clinical diagnosis, curriculum evaluation, or speech and language assessment. He also stated that the Boehm Test of Basic Concepts (1986) may be used individually or in groups, may be employed to assess 50 basic concepts for preschool, first and second grades, and that the preschool form may be used to assess 26 relational concepts starting from age 2 (Bracken, Shaughnessy, 2003).

In sum, this study has found that the Boehm Test of Basic Concepts (Boehm-3) and the Bracken Basic Concept Scale are meaningfully related and that both tests may be used in assessing children's basic concept knowledge. Researcher should consider needs in choosing one test over the other. They should base their decisions on a number of factors such as an evaluation of the children, curriculum, speech and language, risks with respect to learning difficulties, and clinical evaluations.

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Anasınıfındaki Çocuklar İçin Boehm Temel Kavramlar Testi (Boehm-3) ve Bracken Temel Kavram Ölçeği'nin (BBCS) İlişkisinin İncelenmesi

ÖZET

Problem Durumu: Kavramlar zihnin yapı taşlarıdır. Bu yüzden kavramların oluşumu, kullanımı ve gelişmesi bilişsel gelişiminde temel konulardır. Kavramlar çocuklara aktif katılımın olduğu çevre içinde kazandırılır. Bu özel öğrenme deneyimleri, seçme ve eyleme geçmenin çocuğun kontrolünde olduğu doğal, çocuğun bir etkinliği seçtiği ve eyleme geçtiği fakat bazı noktalarda yetişkin müdahalesinin olduğu yapılandırılmamış ve deneyimlerin yetişkin tarafından seçildiği ve yetişkinin yönergelerine göre çocuğun eyleme geçtiği yapılandırılmış olarak tanımlanmaktadır. Okul öncesi dönem, çocuğun pek çok kavramı kazandığı ve hızla öğrendiği bir zaman dilimidir. Temel kavramlar insanların ya da objelerin nitelikleri, mekânda konumu, zaman ve miktarları tanımlamak için kullanılmaktadır. Aynı zamanda çocukların okulda anlatılanları ve etkinlikleri anlaması için gerekli kavramlardır ve temel kavramları anlamak okulda başarılı olmak için önemlidir. Fakat bu kavramların pek çoğu çocuk ilköğretime başlamadan önce çocuğun repertuarına girmemiş olabilir. Araştırmacılar öğrenme güçlükleri olan çocukların temel kavramlarla ilgili zorluklarla daha çok karşılaşma eğiliminde olduklarını ve okul öncesi dönemdeki öğrenme deneyimlerinin yetersizliğinin kavramsal gelişimde farklılıklara neden olabileceğini belirtmektedirler. Bu çalışma ile çocukların hayatı algılamasında çok önemli bir yeri olan ve yanlış algılanma durumunda çocuğun öğrenmesini olumsuz etkileyebilen temel kavram bilgisini ölçmek için geliştirilmiş olan Boehm Temel Kavramlar Testi (Boehm-3,2000) ve Bracken Temel Kavramlar Ölçeği'nin Türk çocukları için korelasyonlarını incelemek hedeflenmiştir. Bu amaçla şu sorulara yanıt aranmıştır; her iki ölçme aracının toplam puanları arasında ilişki var mıdır?, Bracken Temel Kavram Ölçeği alt testlerinden yer-yön, zaman ve miktar alt testleri ile Boehm Temel Kavramlar Testi'nin alan, zaman ve miktar alt testleri arasında anlamlı bir ilişki var mıdır? Her iki test çocukların alan, zaman, ve miktar kavramlarını değerlendirmek için birbirinin alternatifi olarak kullanılabilir mi? Elde edilen bulgularla okul öncesi dönem çocuklarının temel kavram bilgilerinin değerlendirilmesinde alternatif test uygulanmalarının

bulgular açısından değişiklik oluşturup oluşturmayacağı konusuna ışık tutulmaya çalışılmış olacaktır.

Yöntem: Araştırma tarama modelindedir. Orta sosyoekonomik düzey ailelerin çocuklarının devam ettiği Milli Eğitim Bakanlığı'na bağlı resmi ilköğretim okulunun dört farklı anasınıfına devam eden çocuklar ile gerçekleştirilmiştir. Okulda bulunan 94 çocuk arasından rastgele örnekleme yöntemiyle seçilen 17 kız ve 17 erkek olmak üzere 34 çocuk araştırmaya katılmıştır. Çocukların yaş ortalaması 64.8 ay ve standart sapması 3.5 aydır. Araştırmaya katılan çocukların ailelerine çocukların betimsel özelliklerini belirlemeye yönelik araştırmacı tarafından hazırlanan bilgi formu gönderilmiştir. Araştırmaya katılan çocuklara Boehm Temel Kavramlar Testi-3 ve Bracken Temel Kavram Ölçeği bireysel olarak uygulanmıştır.

Bulguları ve Tartışma: Boehm Temel Kavramlar Testi (Boehm-3) ile Bracken Temel Kavram ölçeği toplam puanları arasında anlamlı bir ilişki olduğu bulunmuştur ($r = p < .0001$). Bu sonuç her iki testin anasınıfı çocuklarının temel kavram bilgisini değerlendirmek için kullanılabilmesini göstermektedir. Boehm temel kavramlar testi alt kavramları ile Bracken temel kavram ölçeği alt testleri incelenmiş ve .421 ile .746 arasında değişen pozitif anlamlı korelasyon olduğu bulunmuştur. Sadece Boehm temel kavramlar testinin zaman kavramları ile Bracken Temel Kavram ölçeğinin yer-yön ve miktar alt testleri arasında anlamlı bir korelasyon olmadığı bulunmuştur ($p > .05$). Fakat her iki testin zaman kavramları arasında .421 düzeyinde anlamlı bir korelasyon olduğu bulunmuştur.

Öneriler: Okul öncesi eğitim programının pek çok amacı vardır ve bunlardan bir tanesi de çocukları ilköğretime hazırlamaktır. Programda çocukların ilköğretimde başarılı olabilmeleri için öğretilmesi gereken temel kavramların, ne kadarının kazanıldığı, okulda başarılı olmak için çocukların bu kavramları bilip bilmediğinin uygun ölçme araçları ile değerlendirilmesi gerekmektedir. Hem Bracken Temel Kavram Ölçeği, hem de Boehm Temel Kavramlar Testi çocukların kavram bilgisini değerlendirmek için kullanılabilir. Fakat Bracken Temel Kavram Ölçeğinin madde sayısı ve temel kavramlarla ilgili diğer alt testleri nedeniyle çocukların temel kavram bilgilerinin değerlendirilmesinde daha ayrıntılı sonuçlar verebileceği gözardı edilmemelidir. Uygulama aşamasındaki kolaylık ve zaman açısından daha pratik olması nedeniyle Boehm Temel Kavramlar Testi çocukların temel kavram bilgisinin ön değerlendirmesinde tercih edilebilir. Ayrıca Boehm Temel Kavramlar Testi öğrenme güçlüğü açısından risk altındaki çocukları belirlemeye yönelik olarak kullanılabilirdiği için ilköğretime başlayan çocuklarda tarama amaçlı da kullanılması önerilebilir.