Available online at ijci.wcci-international.org

International Journal of Curriculum and Instruction 13(3) (2021) 2430-2439

IJCI
International Journal of Curriculum and Instruction

An investigation of scientific process skills of children in the Reggio Emilia kindergarten and in a private kindergarten

Banu Özkan*,

Kütahya Dumlupınar University Faculty of Education Dept. of Preschool Education, Kütahya, TURKEY

Abstract

This qualitative study aimed to compare the scientific process skills of 5-6 years old preschool children in kindergartens where Reggio Emilia approach was implemented and not implemented. For this purpose, upon obtaining consent forms from the parents, in total 80 purposefully selected children participated in the study; 35 in a kindergarten adapting the Reggio Emilia program, and 45 in the kindergarten of a private school where Reggio Emilia program was not utilized (n = 80). The data were collected via 'Scientific Process Skills Scale for 60-72-Month Children' developed by Özkan (2015), and analyzed using independent groups t-test and one-way analysis of variance (ANOVA) in accordance with the variables of gender, mother's education status, mother's employment status, number of siblings and school type. The results revealed that there was a significant difference between the variables of school type, gender, and mother's working status and children's scientific process skills, whereas there was no significant difference between other variables and scientific process skills.

Keywords: Reggio Emilia Approach, Scientific Process Skills, Preschool Education

1. Introduction

It can be said that the Reggio Emilia approach will have an impact on scientific process skills as it is child-centered and gives importance to arts and science education. The view of Loris Malaguzzi, founder of the Reggio Emilia Approach, was formed from the views of Dewey, Piaget, Vygotsky, Bruner and others and reflects social constructivism. In Reggio Emilia schools, walls are full of children's work. 3D works, drawings and other artistic products made by children are hung on the walls. When we

* Banu ÖZKAN
E-mail: banu.ozkan@dpu.edu.tr

look at these studies, we can understand what children think. Artistic products and creativity are of great importance in these schools. There are large areas where art works will be done and these areas are called "Atelier" (Pekdoğan, 2012). One of the important differences of Reggio Emilia approach is the project work. Project studies are an opportunity for children to understand their environment, solve problems and develop communication skills (Şahin, 2012).

When the literature is examined, it is understood that research regarding the effects of different educational approaches and programs on scientific process skills are performed. However, there is a small amount of research showing the impact of Reggio Emilia education. In this respect, it is thought that the research will contribute to the literature. In this direction, the main purpose of the study is to comparatively examine the scientific process skills of children attending Reggio Emilia education schools and independent kindergartens.

The skills acquired in the preschool period demonstrate their effect in the later stages of life. For this reason, the education in this period is extremely crucial. Children acquire the concepts of science in this period, like many concepts. In this period, activities that they can question and observe and stimulate the sense of discovery and curiosity will form the basis for them to gain a scientific perspective. Real science education starts with the child's curiosity. Young children use their scientific process skills like a scientist. Like scientists, they need opportunities to express their findings. Thus, children develop a positive attitude for science (Conezio&French, 2002). Scientific process skills have been defined differently as per various researchers. It is among the basic skills that facilitate learning in science education, enable students to be active, develop a sense of responsibility for individual learning, and teach research methods to students. Developing scientific process skills allows students to solve problems, think critically, make decisions, find answers and satisfy their curiosity. Scientific process skills overlap with problem solving skills. Scientific process skills are a lifelong learning process that we use in creating knowledge and problem solving with the principle of learning by doing, which forms the basis for analytical thinking. In other words, it is learning the ways of obtaining information. These skills are defined by determining the paths followed by scientists during their research. (Dönmez&Azizoğlu,2010,Tan&Temiz,2003). Charlesworth and Lind (1995) divided scientific process skills into three as basic, intermediate and high level skills. Preschool children use basic scientific processes, which are the first step of scientific processes, consisting of observation, classification, measurement and communication, guessing and inferencing. The appropriate education to be given to the child in the pre-school period should develop his/her scientific process skills and help him/her use these skills actively in the future. Scientific process skills are the skills that every individual in the society should have in order to be science literate.

The best time to introduce children to science can be considered the preschool period, when they start to wonder about the world around them. Preschool teachers need to create an educational environment where children can benefit from their natural curiosity, develop their basic scientific process skills and develop through experience. In this way, the teacher will be able to support children to become qualified science literate in the future by learning the ways of scientific thinking. Preschool teachers can plan different science activities during the day. In addition to this, it is crucial to prepare environments that will allow students to develop basic scientific process skills. Teachers should have a strong knowledge of basic scientific process skills as well as field knowledge in order to achieve this and should be able to plan and implement activities that will support students to use these skills frequently during the day (Ayvacı, 2010; Kefi, Çeliköz&Erişen,2013; Lind,2000).

Method

2.1. Research Model

The research adopted the scanning model of the quantitative research design.

2.2. Study Group

After consent forms are obtained from the parents, in total 80 (n=80) participant children were selected purposefully in the kindergartens where Reggio Emilia approach was adopted (N=35), and in the kindergarten of a private college where Reggio Emilia approach was not implemented (n = 45).

2.3. Data Collection Tool

The 'Scientific Process Skills Scale for 60-72 Months Old Children' developed by Özkan (2015) was used. The scale consists of 31 items in total. The lowest score that can be obtained from the scale is 0 while the highest score is 31. The KR 20 reliability number for the whole scale was found to be .84.

2.4. Data Analysis

Independent groups t test and one-way analysis of variance (ANOVA) were used in the data analysis performed with the SPSS 23 package program. The scientific process skills score of the children were analyzed in accordance with the variables of gender, mother's education status, mother's employment status, number of siblings and school type, and a significant difference was found between the variables of school type, gender, and mother's working status and children's scientific process skills. There is no significant difference between other variables and scientific process skills.

3.Results

Results of the study are stated using related tables as in the following:

Table1: Independent Groups t Test Results Conducted to Determine Whether the Scientific Process Skills Score Differentiated According to the Gender Variable

Score	Groups	*N*	$\bar{x}$	*ss*	*t* Test		
					t	***Sd***	***p***
Scientific Process Skills	Girl	38	22	4,508	-2,095	78	,039
	Boy	42	24	4,330			

In accordance with the results of the independent groups t test to determine whether the scientific process skills score of the children differ according to the gender variable, there is a significant difference between the scientific process skills score and the gender variable (p <, 05). It is understood that this difference occurred in favor of boys.

Table 2: Independent Groups t Test Results Conducted to Determine Whether the Scientific Process Skills Score Differentiated According to the Number of Siblings Variable

Score	Groups	*N*	$\bar{x}$	*ss*	*t* Test		
					t	***Sd***	***p***
Scientific Process Skills	Having siblings	34	22,97	4,093	-,198	78	,84
	Having no sibling	46	23,17	4,836			

There is no significant difference between the scientific process skills score and the number of siblings according to the results of the independent groups t test (p>, 05)

Table 3: Independent Groups t Test Results Conducted to Determine Whether Scientific Process Skills Score Differentiated According to School Type Variable

Score	Groups	*N*	$\bar{x}$	*ss*	*t* Test		
					t	***Sd***	***p***
Scientific Process Skills	Reggio Emilia	35	26,34	3,029	7,58	77,9	,000
	Other	45	20,56	3,799			

In accordance with the results of the independent groups t test to determine whether the scientific process skills score of children differ according to the school type variable, there is a significant difference between the scientific process skills score and the gender variable (p <, 05). It is understood that this difference is in favor of children attending Reggio Emilia education institutions.

Table 4: Independent Groups t-Test Results Conducted to Determine Whether Scientific Process Skills Score Differentiated According to the Mother's Working Status Variable

Score	Groups	N	$\bar{x}$	ss	t Test		
					t	Sd	p
Scientific Process Skills	Working	52	25,92	3,32	6,008	42,47	,000
	Not working	28	20	4,61			

In accordance with the results of the independent groups t test to determine whether the scientific process skills score of the children differ according to the mother working status variable, there is a significant difference between the scientific process skills score and the mother's working status variable (p <, 05).

Table 5: One-Way Analysis of Variance (ANOVA) Results Conducted to Determine Whether Scientific Process Skills Score Differentiated According to the Educational Status of the Mother Variable

f, $\bar{x}$ and ss Values					ANOVA Results	
Score	Group	N	$\bar{x}$	ss	F	p
Scientific Process Skills	Primary school	7	20,28	4,49	,589	,557
	Secondary school	39	23,10	4,24		
	University	34	23,64	4,71		

In accordance with the results of the independent groups t test conducted to determine whether the scientific process skills score of the children differ according to the maternal education variable, there is no significant difference between the scientific process skills score and the maternal education level variable (p>, 05). In other words, the education level of the mother is not effective on the scientific process skills of the children.

4. Discussion

When the literature is examined, many studies on scientific process skills in early childhood have been found. (Smith,1997; Peterson,2009; Akman, Üstün&Güler,2003; Monhardt & Monhardt, 2006; Alabay,2013; Özkan, 2015; Yılmaz, 2017; Özkan and Tuğluk, 2018; Günşen, Fazlıoğlu & Bayır, 2018;Tuğluk, 2020; Buldur,2019). Likewise, many studies on the Reggio Emilia approach in early childhood are available in the literature (Valentine, 1999; Hewett, 2001; Rinaldi, 2006; Pekdoğan, 2012; Arseven, 2014). However, there is a small amount of research showing the effect of Reggio Emilia approach on scientific process skills in preschool period.

In the study, there is a significant difference between the scientific process skills score and the gender variable according to the independent groups t test results to determine whether the scientific process skills score of the children differ according to the gender variable. This difference occurred in favor of boy students. It is observed that boys are directed to building-building, block, Lego and puzzle-style activities by adults in their selection of toys and games from an early age. This may be effective in the higher scientific process skills score of boys. No significant difference was found between the scientific process skills score and the number of siblings according to the independent groups t test results to determine whether the scientific process skills score of the children differ according to the variable number of siblings. A significant difference was found between the scientific process skills score and the school type variable according to the independent groups t test results to determine whether the children's scientific process skills score differ according to the school type variable. The Reggio Emilia approach is based on children and aims to develop their creativity by offering them opportunities. In addition to this, opportunities such as problem solving, exploration and creative thinking are offered to children, and children who grow up with this system are self-confident, highly creative and open to solidarity (Nutbrown & Abbott, 2001; Akt, Pekdoğan, 2012). In Reggio Emilia schools, the environment is organized to support the creativity of the child and the environment is recognized as the third teacher. In the approach of workshops where artistic works are made, space design, materials and activities are designed to stimulate the child's sense of discovery. It is possible to say that the approach is an approach that supports scientific process skills with all these aspects. Although there is a small amount of research showing the effect of Reggio Emilia approach on scientific process skills in the literature (Şahin, 2019; İnan et al, 2010). There are studies showing that different approaches and educational programs improve scientific process skills (Ayvacı, 2010; Büyüktaşkapu, 2010; Yılmaz, İlkörücü&Çepni, 2018; Özkan, 2015; Özkan&Tuğluk, 2018; Üstündağ&Ergin, 2020).

Şahin (2019) examined the tranformation of the scientific process skills and the concept development of the kindergarteners in the application of Reggio Emilia based scientific exercises. As a result of the research, Reggio Emilia based project exercises are

happened highly effective in regards of the learning process and skill acquisition of the kindergarteners.

İnan,Trundle and Kantor (2010), explored aspects of how the natural sciences were represented in a Reggio Emilia-inspired laboratory preschool. The results indicated that the Reggio Emilia-inspired preschool offered a science-rich context that triggered and supported preschoolers' inquiries, and effectively engaged preschoolers' hands, heads, and hearts with science. The natural sciences learning in this Reggio Emilia-inspired preschool classroom met and exceeded some of Ohio's prekindergarten standards. Tuğluk (2020) in his research investigated the effect of the Primary Years Program (PYP) on the science process skills of children in early childhood education. After the 12 weeks, a significant difference was found between the two groups with regards to their science process skills. Özkan and Tuğluk (2018) examined the effect of drama based mathematics activities on the basic scientific process skills of children in the 5-year-old. Children received drama education in the experimental group had higher scientific process skills score than children in the control group as the result of the research. Yilmaz (2017) concluded that family-attended science activities support scientific process skills of children aged 5-6 years. Buldur (2019) investigated the effect of Montessori Education on preschool children's' scientific process skills. Children with Montessori education had high score as a result of the research.

A significant difference was found between the scientific process skills score and the mother's work status variable according to the independent groups t test results to determine whether the scientific process skills score of the children differ according to the variable of mother's working status. The scientific process skills score of children whose mothers are working are higher than those of children whose mothers are not working. On the other hand, there was no significant difference between the mother's educational status and scientific process skills. The mother's work provides an opportunity for her to improve, regardless of her educational background. Women who work together with the social life brought about by business life are expected to be more conscious and knowledgeable parents. This is the main reason for reaching this finding in the study.

5. Conclusion and Suggestions

According to the results of this study, the scientific process skills of the children who received Reggio Emilia education were higher than the children who attended a private kindergarten. This result shows that Reggio Emilia education has a positive effect on children's scientific process skills. In addition, there is a significant difference between the mother's employment status and gender variables with the scientific process skills. The high score in boys show that boys are mostly directed to science from an early age.

Women who work together with the social life brought about by business life are expected to be more conscious and knowledgeable parents. Therefore, it is thought that they are more interested in their children's academic life.

In the light of the findings obtained from the research, the following issues can be suggested for future research:

1.Early childhood is the period that forms the basis of life and is the period when the child is most open to learning. It is the right time to acquire scientific process skills like all skills. In this direction, it can be suggested that educators include activities that will improve children's scientific process skills.

2.It may be suggested that preschool educators and parents ask questions that will direct children to curiosity and exploration.

3.In this study, the scientific process skills of children who have been educated as per the Reggio Emilia approach have been examined. Similar studies can be conducted with children receiving pre-school education according to different approaches.

REFERENCES

Akman, B., Üstün, E. ve Güler, T. (2003). 6 yaş çocuklarının bilim süreçlerini kullanma yetenekleri. Hacettepe University Journal of Faculty of Education, (24): 11-14.

Alabay, E. (2013). Sciencestart destekli fen eğitim programının 60-72 aylık çocukların bilimsel süreç becerilerine ve bilimsel tutuma güvenme ve yönelime etkisi. Selçuk University. Graduate School of Social Sciences. Unpublished PhD Thesis.

Arseven., A. (2014). The Reggio Emilia approach and curriculum development process. International Journal of Academic Research Part B; 6 (1), 166-171.

Ayvacı, H. Ş. (2010). Okul öncesi dönem çocuklarının bilimsel süreç becerilerini kullanma yeterliliklerini geliştirmeye yönelik pilot bir çalışma. Necatibey Eğitim Fakültesi Elektronik Fen ve Matematik Eğitimi Dergisi. (EFMED). 4 (2), 1-24.

Buldur, A. (2019). Montessori eğitim programına devam eden okul öncesi dönem çocuklarının bilimsel süreç becerilerindeki değişimin incelenmesi. Cumhuriyet International Journal of Education, 8(4), 1172-1186

Büyüktaşkapu, S. (2010). 6 yaş çocuklarının bilimsel süreç becerilerini geliştirmeye yönelik yapılandırmacı yaklaşıma dayalı bir bilim öğretim programı önerisi. (Doctoral thesis). Selçuk University. Graduate School of Social Sciences, Konya.

Conezio, K., French, L. (2002). Science in the preschool classroom. *Young Children.*

Dönmez, F., Azizoğlu, N. (2010;). Meslek liselerindeki öğrencilerin bilimsel süreç beceri düzeylerinin incelenmesi: Balıkesir ili örneği. Necatibey Faculty of Education Electronic Journal of Science and Mathematics Education ,4 (2), pp. 79-109.

Günşen, G., Fazlıoğlu, Y., & Bayır, E. (2018). The effects of constructivist approach based science teaching on scientific process skills of 5 years old children. Hacettepe University Journal of Education, 33(3), 599-616.

Hewett, V.M. (2001). Examining the Reggio Emilia Approach to Early Childhood Education. Early Childhood Education Journal 29, 95–100

İnan, Z. Trundle, K., Kantor. R. (2010). Understanding natural sciences education in a Reggio Emilia-inspired school. Journal of Research in Science Teaching, 47, 1186- 1208.

Kefi, S., Çeliköz, N., Erişen, Y. (2013). Okul öncesi eğitim öğretmenlerinin temel bilimsel süreç becerilerini kullanım düzeyleri. Eğitim ve Öğretim Araştırmaları Dergisi. 2 (2).300-319.

Lind, K. K. (2000). Exploring Science in Early Childhood Education. Delmar: USA

Monhardt, L., Monhardt R., (2006). Creating a context for the learning of science process skills through picture books, Early Childhood Education Journal, 34, 67–71.

Özkan, B. (2015). 60-72 aylık çocuklar için bilimsel süreç becerileri ölçeğinin geliştirilmesi ve beyin temelli öğrenmeye dayanan fen programının bilimsel süreç becerilerine etkisi. (Doctoral Thesis). Marmara University, İstanbul.

Özkan, B., Tuğluk, M. (2018). The effect of drama based mathematic activities on scientific process skills of 5 year old children. Electronic Turkish Studies Journal. 13 (11), 1083-1091.

Pekdogan, S (2012). ReggioEmilia Yaklasimi Uzerine Bir Calisma, Abant Izzet Baysal University Egitim Fakultesi Dergisi. 12 (2).

Peterson, S.M. (2009). Narrative and pragmatic explanations in preschool science discourse. Discourse Processes, 46, 369-399.

Rinaldi, C. (2006). In dialogue with Reggio Emilia: Listening, researching, and learning. London, UK: Routledge

Şahin,A. (2019). Reggio Emilia Yaklaşımlı Fen ve Doğa Etkinliklerinin Uygulanması: Bir Eylem Araştırması (Master Thesis), Afyon Kocatepe University, Afyon.

Üstündağ, K., Ergin, B. (2020). Montessori Yönteminin Okul Öncesi Dönemdeki Çocukların Bilimsel Süreç Becerilerine Etkisinin İncelenmesi. Electronic Turkish Studies , 15 (2),1483-1498.

Smith, D. W., (1997). Elementary Students' Use of Science Process Skills in Problem Solving:The Effects of an Inquiry-Based Instructional Approach. Educational Theory and Practice. Ohio State, Ohio State University.

Şahin, F. (2012). Erken Çocukluk Eğitiminde Yaklaşımlar ve Programlar. Reggio Emilia Yaklaşımı. Temel, Z.F. (Ed). Ankara: Vize Yayınları.

Tuğluk, M. N. (2020). The effect of primary years program (PYP) on children's science process skills (SPS) in early childhood education. Cypriot Journal of Educational Sciences, 15(5), 1276–1287.

Valentine, M. (1999). The Reggio Emilia Approach to Early Years Education. Early Education Support Series. Scottish Consultative Council on the Curriculum.

Yılmaz, G. (2017). Aile Katılımlı Fen Etkinliklerinin 5-6 Yaş Grubu Çocukların Bilimsel Süreç Becerilerine ve Bilimsel Tutumlarına Etkisi. (Master thesis). Uludağ University, Bursa.

Yılmaz, G., İlkörücü, Şirin, & Çepni, S. (2018). The effects of parent-involved science activities on basic science process skills of the children in the age group of 5-6. Pegem Eğitim ve Öğretim Dergisi, 8(4), 879-903.