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How the Project Approach Affects Pre-schoolers' Creativity

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ABSTRACT With this paper, the researchers aim to determine whether the project-based approach affects preschoolers' creativity. An experimental design was used involving a pretest, post test, and retention test to compare an experimental and control group, as well as a general information form for collecting basic information about the participating students and their families and the Torrance Test of Creative Thinking: Figural Form A. Results showed that project-based education influenced the students' creativity, since the statistical evaluations of each mental characteristic assessed in the creative thinking test revealed no significant difference ($p > .05$) between the pre- and post test scores of the experimental and control groups regarding the subdomain of elaboration. However, significant differences emerged concerning the subdomains of fluency, originality, abstractness of titles, resistance to premature closure, and overall creativity between the pre- and post tests ($p < .01$).

INTRODUCTION

In today's rapidly developing world, raising individuals who reflect upon, conduct research about, and are sensitive to what happens in their environments has become increasingly important. By extension, educational institutions should foster their students' self-confidence, research skills, and creativity so that these individuals can adapt to sudden changes and developments, analyze knowledge and ideas, generate and implement new ideas, establish open and safe communication, and work readily with others.

Each individual displays differences in how his or her creativity emerges. In this context, *creativity* means using objects or concepts in atypical ways, while a review of definitions of *creativity* suggests that the concept is characterized by novelty, innovation, originality and invention. Establishing a previously undiscovered relationship between two concepts, grasping similarities and differences, and associating past experiences with new situations all indicate creative thinking skills (Dokmen 2001; Mindham 2005). Since any new idea is often a reconstitution of known ideas or a translation of an existing idea into a new form or with a new frame of reference, creativity is considered to be a significant characteristic in adaptation skills, as well as useful in facilitating individuals' searches for new ways to resolve interpersonal problems (Butcher and Niec 2005). Though the emergence, development, degree, and continuance of creativity differ from one individual to the next, creativity is generally associated with multidimensional reflection, vigilance in newly encountered situations, and the abilities to think and act easily, quickly, and independently and to deduce various conclusions (Hildebrand 1991; Mayosky 1995).

Creativity is a pivotal concept in many disciplines. Especially in education, creativity is considered to constitute a significant output (Goree 1996; Aslan 2007). In this sense, educational institutions assume the responsibility of nurturing individuals who can think creatively, as well as of retaining and improving their potential. Creative individuals are curious, self-confident people who can find practical solutions to problems, think flexibly and independently, enjoy complex and challenging tasks, and easily establish empathy, as well as are open to novelty, are imaginative, and energetic (Yildiz et al. 2003; Aslan 2007). As a reflection of these anticipated qualities, several educational models have been implemented in educational institutions, though the content knowledge and skills of the objectives of the different models vary. In general, however, these models aim to raise individuals who are emotionally and behaviorally strong, open to novelty and are creative. To foster such personalities, preschoolers in particular must be prepared by engaging rich, affirmative and constructive experiences (Berretta and Privette 1990; Yildiz et al. 2003; Aslan 2007).

In general, *creativity* also connotes the act of creation: doing new and different things, as well as devising new inventions and ideas by making use of known ones. It has also been suggested that creativity is associated with the instinctive, spontaneous, original reactions of individuals, despite the customs of everyday life that hinder the development of original behavior and complicate the discovery of signs of creativity in children. To be creative, individuals must above all, recognize themselves, realize their ideas, emotions and competencies, think independently, occasionally operate beyond routine patterns and rules, and have the means and freedom to use their skills to the fullest extent. Though the emergence and development of creativity varies from one child to the next, in order to improve creativity in children, it is critical to begin their education at especially early ages and prepare and present media to them that contain diverse stimuli to improve their senses (Demirel 2010).

In lieu of typical narration-based systems, educational systems worldwide have begun to involve different student-centered approaches that aim to nurture individuals who are more active and who can think, solve problems, pose questions, and produce results based on their learning. One such educational approach is the project approach, which was developed as a student-centered approach against educational programs worldwide, wherein independent sets of information—that is, project activities—are increasingly integrated into the students' education. The project approach emphasizes processes designed for improving students' skills in planning individual learning processes toward meeting certain objectives, conducting research and collaborating, assuming responsibilities and collecting and organizing information (Cakiroglu 2014). In this approach, students thoroughly examine content knowledge that aligns with their interests and curiosities, typically by seeking answers to questions posed during project activities and recording what they have learned and experienced. As a result, students acquire the skills necessary to conduct purposed, constructive work, and to solve complex problems. While actively learning, students assume greater responsibilities and learn to analyze their strengths and weaknesses constructively. In turn, this outcome encourages students to continue conducting research, to review and to think critically. It also supports the formation of positive self-perceptions, chiefly by allowing students to establish intensive relationships with their environments by connecting schoolwork and their lives in a process of developing affirmative emotions about themselves. The approach thus also raises students' awareness of significant issues in their environments and motivates them to interact directly with social problems, thereby improving their problem-solving skills and creative thinking (Moran 1997; Leskiw 1998; Williams 1998).

The project approach used in Turkey has been compared with educational models used in other countries, including the experiential education approach (Karabay et al. 2015). Moreover, the project approach and creativity have specifically been examined in terms of how they concern different age groups (Williams 1998; Baylav Korkmaz 2002; Maple 2005; Birinci 2008; Karatas and Ozcan 2010), and findings have suggested that project-based learning might benefit creativity in certain students. For instance, Alacapinar (2008) has reported that the project approach enhanced the creativity of students. At the same time, studies on the topic conducted in Turkey remain limited and have mostly addressed primary school students, not preschoolers. Since project approach-based education might be a factor of improved creativity, the researchers in this paper hereby aimed to examine how education based upon the approach, impacted children's creativity. In doing so, the researchers contribute to understandings of how project approach-based curricula can benefit preschool students, as well as offer results to guide further studies and make evidence-based recommendations for educators.

MATERIAL AND METHODS

Research Design

The research was conducted according to an experimental design with a control group and involved a pretest, post test and retention test.

Experimental Group

The experimental group consisted of 34 children, 18 of whom were allotted to the experimental group and 16 to the control group. All participating students attended the nursery classes of

official primary schools in central Adana, Turkey, during the research period.

Data Collection Instruments and Procedure

Data regarding pretest scores was collected in the Spring 2011 semester, and retention test scores were collected in Summer 2011, subsequent to the experimental group's completion of the 11-week project approach-based learning program.

The general information form developed by the researchers and the Torrance Creative Thinking Test: Figural Form A, were used as data collection tools. Developed by Torrance (1966), the verbal and figural sections of the Torrance Creative Thinking Scale have been adapted for Turkish contexts by Aslan (2001; 2006), and the Turkish translation, adaptation of the test items to Turkish, and the validity and reliability of the Turkish translation have been examined. The correlation between the English and Turkish language test applications was found to be significant in terms of figural creativity ($r = 0.5$), while internal consistency fell in the range of $r = 0.3$-0.8. The least value of the preschool group, in Cronbach's alpha was 0.5 and the highest internal consistency coefficient 0.7. Both the internal and external validity were gauged according to validity criteria, an adjective list, the Wechsler Adult Intelligence Scale and the Wonderlic Personnel Test (that is, a general skills test). Analyses showed that the Torrance test was reliable for all age groups and score types (Aslan 2001).

The Torrance Creative Thinking Test: Figural Form A was administered to both the experimental and control groups as a pretest. The experimental group received project approach-based education for 11 weeks for approximately four hours per day along with their routine education. By contrast, the control group continued to participate in their routine educational program. Upon completing the project approach-based education, students in both the experimental and control groups completed the post test. Three weeks after taking the post test, each participant in the experimental group completed a retention test.

Data Collection

Prior permissions for conducting this research were obtained from the relevant institutions. The school directors, teachers, and students' parents were interviewed and informed of the purpose of the research. During the research, project approach-based educational programs were prepared for the subjects of paper, the color orange and teeth, all of which were considered to attract preschoolers' attention. The project approach-based education program prepared accordingly, was submitted for review to 10 experts, and necessary revisions were made in response to their feedback.

Data Analysis

Both parametric and nonparametric analyses were used to assess the purposes of the research based on the results of the normality test for the analysis of data collected by the Torrance Creative Thinking Test: Figural Form A.

A review of the results of the Kolmogorov-Smirnova test shows that the pretest, post test and retention test scores of the children pertaining to the fluency subdomain of the Torrance test did not suggest normal distribution. It was also observed that in other subdomains, at least one measurement did not comply with normal distribution. The parametric and nonparametric analyses used to this end are provided in detail below.

Due to such noncompliance with normal distribution, a Mann-Whitney U test was administered to ascertain any significant difference between the experimental and control group regarding pretest mean scores pertaining to the Torrance test and the Total Creativity scale. Furthermore, since the pretest mean scores of both groups did not differ according to the subdomains of fluency, originality, or abstractness of titles, another Wilcoxon *Z* test was administered to identify pre- and post test score differences of the experimental and control groups in the foregoing subdomains. At the same time, since the pretest mean scores of both groups also differed according to the subdomains of elaboration and resistance to premature closure, another Mann-Whitney U test was administered to pinpoint the differences in pre- and post test scores between the two groups of participants concerning the Torrance test and the Total Creativity scale.

The differences between the pretest and retention test scores of the experimental group obtained for the subdomains of fluency, origi-

nality, abstraction of titles, and resistance to premature closure of the Torrance test that did not comply with normal distribution were analyzed by another Wilcoxon *Z* test. To examine the differences between the pretest and retention test scores obtained from the elaboration subdomain and the Total Creativity scale that complied with normal distribution, a Student's *t*-test was applied.

In the case that a group's numbers were at least 15 and given that the scores did not overly deviate from the norm, data analysis was performed with parametric tests. However, since *SD* values were either extremely high or low in certain subdomains of the Torrance test, which indicated excessive heterogeneity and thus excessive deviation from the norm, parametric analysis could not be used (Buyukozturk 2002, 2010; Akgul 2005).

RESULTS

The results pertaining to the pretest mean scores of the experimental and control groups obtained from the subdomains of the Torrance Creative Thinking Test is given in Table 1.

As can be seen from the Table 1, no differences emerged regarding the pretest scores between the experimental and control groups as obtained from fluency (Mann-Whitney U = 117.5, $p > .05$), originality (Mann-Whitney U = 115.0, $p > .05$), and abstraction of titles (Mann-Whitney U = 95.0. $p > .05$) sub-domains. However, differences concerning the pretest scores between the experimental and control groups obtained from sub-domains of elaboration (Mann-Whitney U = 56.5. $p < .01$), resistance to premature closure (Mann-Whitney U = 65.0, $p < .01$), and the Total Creativity scale were significant (Mann–Whitney U = 76.5, $p < .0.05$).

The results pertaining to the pre- and post test mean scores of the experimental and control groups obtained from the sub-domains of fluency, originality, and abstraction of titles of the Torrance Creative Thinking Test is presented in Table 2.

A review of the data suggested a significant difference between the pre- and post test means scores for the fluency sub-domain of the experimental (Wilcoxon $Z = -3.671$) and control groups (Wilcoxon $Z = -3.294$), as well as a significant increase in the post test scores ($p < .01$). Despite a significant difference in the pre- and post test mean scores of the experimental group for the originality and abstraction of titles sub-domains (Originality: Wilcoxon $Z = -3.671$, $p < .05$; Abstraction of titles: Wilcoxon $Z = -3.6$, $p < .001$), no such significant difference between the pre- and post test mean scores of the control group appeared (Originality: Wilcoxon $Z = -0.597$, $p > 0.05$; Abstraction of titles: Wilcoxon $Z = -1.0$. $p > .05$). This result can generally be interpreted to indicate that project approach-based education benefited the creativity of students in terms of their originality and abstraction of title.

The results of the pre- and post test score differences of the experimental and control groups in the subdomains of elaboration and resistance to premature closure of the Torrance Creative Thinking Test is given in Table 3.

Table 1: Mann–Whitney U test results pertaining to the pretest mean scores of the experimental and control groups obtained from the subdomains of the Torrance Creative Thinking Test: Figural Form A and the Total Creativity scale

Sub-domain	*Group*	*N*	*X*	*SD*	*Mean rank*	*Mean total*	*Mann–Whitney U*	*p*
Fluency	DG	18	37.06	4.671	16.03	288.5	117.5	0.305
	KG	16	38.25	3.022	19.16	306.5		
Originality	DG	18	18.06	12.027	15.89	286	115.0	0.316
	KG	16	21.81	10.284	19.31	309		
Abstraction of Titles	DG	18	1.22	1.555	14.78	266	95.0	0.081
	KG	16	2.56	2.581	20.56	329		
Elaboration	DG	18	6.94	4.263	12.64	227.5	56.5	**0.002****
	KG	16	11.75	3.821	22.97	367.5		
Resistance to Premature Closure	DG	18	0.67	1.372	13.11	236	65.0	**0.003****
	KG	16	2.63	2.217	22.44	359		
Total	DG	18	17.83	7.780	13.75	247.5	76.5	**0.020***
	KG	16	21.84	6.806	21.72	347.5		

Notes: $^{*}p < .05$, $^{**}p < .01$

Table 2: Wilcoxon *Z* test results pertaining to the pre- and post test mean scores of the experimental and control groups obtained from the subdomains of fluency, originality, and abstraction of titles of the Torrance Creative Thinking Test: Figural Form A

Scale	*Group*	*n*	*x*	*SD*	*Wilcoxon Z*	*p*
Fluency(Pretest)	DG	18	37.06	4.671	-3.671	**0.000****
Fluency(Post test)			45.67	1.414		
Fluency(Pretest)	KG	16	38.25	3.022	-3.294	**0.001****
Fluency(Post test)			44.31	3.301		
Originality(Pretest)	DG	18	18.06	12.027	-3.671	**0.031***
Originality(Post test)			26.94	14.363		
Originality(Pretest)	KG	16	21.81	10.284	-0.597	0.550
Originality(Post test)			23.31	16.664		
Abstraction of titles (Pretest)	DG	18	1.22	1.555	-3.600	**0.000*****
Abstraction of titles (Post test)			5.94	4.036		
Abstraction of titles (Pretest)	KG	16	2.56	2.581	-1.080	0.280
Abstraction of titles (Post test)			3.31	3.321		

Notes: **$p < .05$, ***$p < .01$, ****$p < .001$

Table 3: Mann–Whitney U test results of the pre- and post test score differences of the experimental and control groups in the subdomains of elaboration and resistance to premature closure of the Torrance Creative Thinking Test: Figural Form A and the Total Creativity scale

Sub-domain	*Group*	*n*	*Post test*	*Pre test*	*Pretest–post test difference*	*SD*	*Mann–Whitney U*	*p*
Elaboration	DG	18	10.67	6.94	3.73	5.211	101.0	0.137
	KG	16	11.81	11.75	0.06	5.260		
Resistance to	DG	18	3.17	0.67	2.50	2.728	85.0	**0.040***
Premature Closure	KG	16	3.06	2.63	0.43	2.707		
Total	DG	18	33.01	17.83	15.18	6.738	29.5	**0.000****
	KG	16	24.54	21.84	2.70	7.273		

Notes: *$p < .05$, **$p < .01$

There is no significant difference between the pre- and post test scores of the experimental and control group obtained for the subdomain of elaboration of the Torrance test (Mann-Whitney U = 101.0, $p > 0.05$). Whereas the pre- and post test score differences of the sub-domain of resistance to premature closure of the Torrance test revealed mean score differences of the experimental and control groups of 2.5 and 0.4, respectively, according to the Mann-Whitney U test results, there was a significant difference in the pre- and post test mean scores of the experimental and control groups regarding this subdomain (Mann-Whitney U = 85.0. $p < .05$). However, there was no significant difference in the pre- and post test mean scores between the experimental and control groups regarding Total Creativity scale scores (Mann–Whitney U = 29.5, $p < .01$), a result perhaps stemming from the fact that project approach-based education influenced the creative thinking of participants.

The results of the post test and retention test mean scores of the experimental group for subdomains of the Torrance Creative Thinking Test si given in Table 4.

There is no significant differences between post test and retention test mean scores of the sub-domains of fluency, originality, abstraction of titles, resistance to premature closure, and elaboration, as well as of the Total Creativity scale (Wilcoxon $Z = -0.447$, $p > 0.05$). The above results recommend a conclusion that project approach-based education improved the students' creativity in the subdomains of fluency, originality, abstraction of titles, resistance to premature closure, and elaboration, as well as on the scale of Total Creativity. Furthermore, retention test scores underscore that the effect of such education continued for at least three weeks after the completion of the program.

DISCUSSION

It is well established that educational practices aimed to improve creativity influence stu-

Table 4: Wilcoxon *Z* test and paired sample *t* test results of the post test and retention test mean scores of the experimental group for subdomains of the Torrance Creative Thinking Test: Figural Form A and the Total Creativity scale

Sub-domain	*Measure*	*n*	*X*	*SD*	*Wilcoxon Z*	*t*	*p*
Fluency	Post test	18	45.67	1.414	-0.447	-	0.655
	Retention	18	44.61	5.893			
Originality	Post test	18	26.94	14.363	-0.142	-	0.887
	Retention	18	28.67	16.095			
Abstraction of Titles	Post test	18	5.94	4.036	-0.404	-	0.686
	Retention	18	6.11	4.418			
Resistance to Premature Closure	Post test	18	3.17	2.595	-1.681	-	0.093
	Retention	18	2.28	2.718			
Elaboration	Post test	18	10.67	4.087	-	0.358	0.725
	Retention	18	10.33	3.498			
Total	Post test	18	33.01	6.443	-	-0.050	0.961
	Retention	18	33.12	8.279			

Note. $p > .05$

dents' creativity. Aral and Koksal et al. (1999) found in their study that art education influenced creativity and concluded that students who received art education scored higher in the originality subdomain than students who did not receive such education. Since artistic activities are incorporated to a high degree in project activities that are part of the project approach, it is expected—as it was in the present research—that project approach-based education can improve the children's creativity.

The project approach can also improve the students' creativity in terms of their abstraction of titles, a subdomain of the Creative Thinking scale of the Torrance test associated with the skill of devising appealing titles for new products. This skill requires the synthesis and organization of processes and transactions, as well as knowledge of what is important to emphasizing the chief theme within the frame of reference of a given subject (Aslan 2001). The project approach-based education program administered to the experimental group during the research entailed various activities: forming narratives, devising highly suitable and interesting titles, finding appropriate titles for any narratives used, preparing and titling books, issuing and titling newspapers and each of their sections, and devising suitable, interesting names for student paintings, among others. It is considered that incorporating these and similar activities into the students' educational practices induced significantly different mean scores of the experimental group versus the control group regarding the subdomain of the abstraction of titles.

Korkmaz (2002) found similar results in a study of the effects of a project-based learning approach on students' creative thinking. Meanwhile, other studies on the topic have suggested that the creativity of individuals can be substantially influenced by project approach-based educational practices (Altekin 2002). Still other studies by Baylav Korkmaz (2002), Birinci (2008), and Karatas and Ozcan (2010) have also confirmed a positive relationship between project-based learning approaches and students' creative thinking.

As anticipated, the results of the present study indicate that project approach-based education makes a significant difference in the creativity of children. Students' frequent involvement in activities that improve creativity, while completing projects is considered to have influenced the increase in scores on the Total Creativity scale of the experimental group. Meanwhile, the control group received only the preschool education program approved in 2006 by Turkey's Ministry of National Education. Though the program also included activities in support of creativity, results still largely favored the experimental group.

Katz and Chard (2000) have determined the content and goals of the project approach from a frame of reference involving students' learning of new knowledge, behaviors, skills, and emotions. In all project activities (for example, games at learning centers, counting and measuring, creating narratives, drama, art, reading and writing, playing, movement, and field trips) throughout the project approach-based education process,

students were active participants and acquired the knowledge that they sought in line with their personal interests and skills. The project activities involved in the project approach are thus considered to be a way for students to better understand, express themselves, structure their surroundings, and develop awareness. The activities of preschool education can also provide students with an educational milieu in which they can apply the knowledge they (could) have learned via systematic education, chiefly by supporting their natural curiosity and widening their imagination, as well as a milieu in which all areas of development are supported. This milieu, which is free of strict classroom rules, provides an environment containing diverse stimuli that attract and motivate students, as well as promote their research. In this flexible and free classroom atmosphere, students are responsible for their personal behaviors and are encouraged to recognize and control their behavioral patterns according to peer feedback received during their interactions. As a result of project activities, it can be easier for students to gain desired skills in each subdomain of creative thinking, all of which contribute to the development of their creativity (Chard 1992; Katz 1998; Katz and Chard 2000; Maple 2005).

In support, Bullard and Bullock (2002) concluded in their study of the effect of project approach-based education among preschoolers that such education provided a good learning environment and consequently influenced the social, creative, and cognitive development of the students. Later, Memisoglu (2008) investigated the effect of project-based learning approaches on students' success, attitudes, creativity, and problem-solving skills and found a significant difference between the scores of the experimental and control groups that favored the former. These findings suggest that the creativity of students in the experimental group improved due to the project-based learning approach. Furthermore, students' attitudes toward the course were replaced by more pleasurable, less uniform research-oriented attitudes that promoted their active engagement. The students showed improved feelings of confidence and were observed to assume greater responsibilities. They also demonstrated enhanced presentation, graph making and graph interpreting, social interaction, critical thinking and problem-solving skills.

Korkmaz (2002), Tavukcu (2006), and Yilmaz (2006) also ascertained in their respective studies that project approach-based education influenced the improvement of students' creative thinking. Considering the results of similar studies, project approach-based education thus benefits education in terms of students' development of creativity.

CONCLUSION

The results of this research reveal a significant difference between the pre- and post test scores of the experimental group in terms of the creativity subdomains of fluency, originality, abstraction of titles and resistance to premature closure and the Total Creativity scale of the Torrance Creative Thinking Test: Figural Form A. There was, however, no significant difference between the pre- and post test scores regarding the subdomain of elaboration. Furthermore, the post test and retention test mean scores of the experimental group on the Torrance test's Creative Thinking scale were not significantly different, suggesting that the effects of the project approach-based education program continued for at least 3 weeks after the students' completion of the program.

RECOMMENDATIONS

In light of this paper's findings, the researchers recommend that future research should aim to determine the effects of the project approach on the creativity of students in primary school, secondary school, and/or high school. Longitudinal studies may also be launched to identify the long-term effects of the project approach on creativity among students. Other studies should also aim to determine how the project approach affects different traits and skills of students, including problem-solving skills and self-perception. The relationship between students' creativity and that of the teachers may also be a worthwhile topic for study.

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