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The effect of academic and language skills educational program on children's cognitive abilities

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Abstract

Language and skills oriented activities are one of the important activities in the educational process and they provide the necessary foundations for the development of cognitive abilities. This study aims to investigate the effect of Academic and Language Skills Educational Program on 61-66 month old Children's Cognitive abilities. The sample of this experimental study included a total number of randomly selected 61-66 month old 64 children (34 experiment and 34 control) attending to kindergardens in Ankara – Turkey during 2012-2013 academic year. In order to find out children's level of reasoning abilities, "Cognitive Abilities Test Form-6" which was developed by Lohman and Hagen (2000) and adapted to Turkish children by İnal (2011) was used. The data gathered, then, was analyzed with appropriate statistical techniques. As a result, it was reported that there is a statistically significant effect with a large effect size between the control and experiment groups' verbal dimension and quantitative dimension scores on the pretest and verbal dimension and quantitative dimension corrected scores on the posttest. In the light of findings, "Academic and Language Educational Program" can be reported as facilitating children's cognitive abilities. The findings are similar in those of Starkey, Klein

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and Wakeley (2004), Welsh et al. (2010), İnal (2011) all of whom studied preschoolers' cognitive abilities development using experimental designs.

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Keywords: early childhood education; academic and language skills educational program; cognitive abilities

1. Introduction

Children at pre-school stage in which development and learning is the most intense and rapid search for reasonable answers to questions like “what, why, how” and understand rules and principles, categorize the events and objects, establish reason-result relationship between concepts and events, and reason by figuring out problem cases. In this way, their cognitive abilities are started to be founded and developed. Within this process, as children's cognitive abilities are supported, their use of cognitive structures and abilities gets better, their thinking skills develop and so they start to make better sense of the world they live in (Heffelfinger and Mrakotsky, 2006:45). Therefore, it is a necessity for children to receive training aiming language and early academic skills which will have children at pre-school stage use their cognitive abilities at utmost level (Cohen, 2005:229).

1.1. Problem Statement

Cognitive abilities include mental process elements such as attention, perception, memory, reasoning, decision making and problem solving, and the whole development occurring in these elements (Cohen, 2005:6; Vallotton and Fischer, 2009:102-114). When provided with education processes where cognitive abilities and academic skills are tightly integrated, children at pre-school stage form every kind of new cognitive structures besides using formerly available general cognitive abilities (Bidell and Fischer, 2005:16-18, Vallotton and Fischer, 2009:102-114).

Development of literacy and mathematics skills, which are two sub fields of early academic skills, and early language skills are closely related to development of cognitive abilities as they include cognitive processes such as learning, attention, perception and memory (Cohen, 2005:229; Dehn, 2008:92). Research by Berninger and Richards (2002) and Swanson and Berninger (1996) put forth that memory components and academic skills have strong relationship. Engle (1996) determined that there is a high correlation between the capacity of working memory and language, reading, speaking, following verbal instructions, vocabulary knowledge, note taking, writing, reasoning and complex learning abilities (as cited in Dehn, 2008:93).

Van der Sluis, De Jong and Van der Leij (2007) examined the relationship of executive function with reasoning, reading and arithmetic and identified that there is a high correlation between updating and non-verbal reasoning, reading and arithmetic, and between transfer and non-verbal reasoning and reading. Welsh, Nix, Blair, Bierman and Nelson (2010) examined the effect of education processes that support literacy and mathematics skills of children at pre-school stage on general-cognitive development (working memory and attention control) and special abilities (learning literacy quickly). The research results reveal that working memory and attention control guide learning literacy quickly, and the development in general-cognitive abilities has a unique contribution to mathematics and literacy skills. As the research proves, there is a strong correlation between children's cognitive abilities and early academic and language skills. In training programs which take this relationship as a basis and ensure active participation of children, children make inferences about events, situations and objects in their surroundings and try to make sense out of them via their experiences. Particularly at pre-school stage, training programs supporting skills that form the basis of academic success such as language, literacy and mathematics reinforce the development of abilities such as remembering objects, situations, events, numbers or words, matching, grouping, ordering, counting, recognizing symbols, comprehending

concepts, establishing reason-result relationships, problem solving and reasoning (Eliason and Jenkins, 2003:250-251; Ezell and Justice, 2005:54; Wortham, 2006:220). Education provided for children at pre-school stage aiming language and academic skills not only has effect on children's cognitive abilities but also has a critical role in their academic success in later learning experiences.

2. Research Question

Is there a significant difference between the pre-test and corrected post-test scores of experiment and control group children on Cognitive Abilities Test Form-6 Quantitative and Verbal dimensions?

3. Aim

This study aims to investigate the effect of Academic and Language Skills Educational Program on 61-66 month old Children's Cognitive Abilities.

4. Method

In this research, it is aimed to investigate the effect of Academic and Language Skills Educational Program on 61-66 months old children's cognitive abilities.

4.1. Research Model

Pre-test and post-test control group experimental design is used in the research in order to test the effect of Academic and Language Skills Educational Program on children's cognitive abilities. Quasi-experimental design is used in the research since two of the available groups were matched with respect to their cognitive abilities without random assignment and the groups that are equal with respect to cognitive abilities were randomly assigned to experimental and control groups (Büyüköztürk, Kılıç Çakmak, Akgün, Karadeniz and Demirel, 2012:208).

4.2. Population and Sample

61-66 month old children attending to nursery classes that are affiliated to Ministry of National Education and located in Çankaya central district of Ankara in the academic year of 2012-2013 form the population of the research. As a sample, 64 children in total were selected randomly for experimental (32) and control (32) groups from among preschool children that showed normal development, that hadn't formerly participated in any special training program supporting academic and language skills and cognitive abilities, and that volunteered to take part in the study.

In the experimental group, 46.9% of the children were female, 53.1% male; 59.4% of the children were first child, 6.2% of the children were middle child, 34.4% were last child, 43.8% were single child, 46.8% had one sibling and 9.4% had two or more siblings; 50.0% of the children previously had preschool education and 50.0% of the children didn't have preschool education before. In the control group, 43.7% of the children were female, 56.3% male; 43.8% of the children were first child, 18.7% of the children were middle child, 37.5% were last child, 28.1% were single child, 62.5% had one sibling and 9.4% had two or more siblings; 46.9% of the children previously had preschool education and 53.1% of the children didn't have preschool education before.

4.3. Data Collection Tool

“General Information Form” developed by the researcher was used in the research in order to gather personal information about children and their families. “General Information Form” includes questions as to child’s date of birth, gender, birth order, number of siblings, whether s/he went to pre-school education institution; their parents’ level of education, jobs and whether they work or not. As a data collection tool, “Cognitive Abilities Test Form 6”, which is developed by Lohman and Hagen (2000) and adapted to Turkish by İnal (2011), in order to identify children’s cognitive abilities. Cognitive Abilities Test Form 6 aims to assess the level of verbal, quantitative and non-verbal reasoning and problem solving abilities that children between the ages of 5-18 reach. This test assesses abilities such as distinguishing between similarities and differences, deducing from the general to the specific, figuring out the problem and solving it, classifying the objects and transferring knowledge. Cognitive Abilities Test Form 6, which can be administered individually or with a small group, consists of 120 questions that assess the reasoning ability from three dimensions: verbal, quantitative, and non-verbal. It takes 30-40 minutes to administer the test. In a validity and reliability study by İnal (2011), that was carried out on 61-72 month-old 380 children that have normal development and that attend to kindergartens affiliated to five primary schools in the central district of Afyonkarahisar, it is identified that KR-20 values of Cognitive Abilities Test Form 6 are .76 for the Verbal Battery, .82 for the Quantitative Battery, .70 for the Non-Verbal Battery and .91 for the overall test. That internal consistency coefficient of subtests is high proves the reliability of the test. According to test retest reliability values, it is identified that there is a high correlation among the values gathered from the first and second administrations of the overall, verbal, quantitative and non-verbal dimensions of Cognitive Abilities Test Form 6. Analysis results show that test retest correlation between groups is .895 for verbal dimension, .989 for quantitative dimension, .968 for non-verbal dimension and .984 for overall test; and, it is identified that there is a significant relationship between two test results ($p < 0.05$).

As it is aimed in the study to investigate the effects of Academic and Language Skills Educational Program on 61-66 months old children’s cognitive abilities, verbal reasoning (40 items) and quantitative reasoning (40 items) of Cognitive Abilities Test Form 6 are utilized.

4.4. Academic and Language Skills Educational Program

Academic and Language Skills Education Program, developed by the researcher, is based on supporting 61-66 month old children’s cognitive abilities and early academic and language skills at pre-school stage. To develop Academic and Language Skills Educational Program, related literature and curriculum contents of pre-school education approaches such as Montessori, High Scope and Reggio Emilia were reviewed. After the literature review and curriculum analyses, it was concluded that the field related to Academic and Language Skills is quite wide. Therefore, educational program is planned as two stages. The first stage includes simpler training processes related to the field and the second stage includes harder training processes. As only the first stage of the training program is included within the scope of this research, it was decided that Academic and Language Skills Educational Program should consist of 40 learning practices twenty of which is about “Language and Getting Ready to Literacy” and twenty of which is about “Mathematics”. Besides the literature on language and academic skills, objectives and acquisitions of Ministry of National Education Pre-School Education Curriculum (2006) were reviewed during the development of learning processes. In line with these objectives and acquisitions, learning processes were planned using appropriate activities considering children’s individual differences and their developmental characteristics, and considering principles of moving from close to the far, from simple to complex, and from concrete to abstract.

Among the activities in Academic and Language Skills Educational Program which is to be administered to experimental group, Cognitive Abilities (attention, perception, memory, problem solving, reasoning) are included as method so that these activities are integrated with the main activities. Academic and Language Skills Educational Program was prepared such that it would ensure children’s active participation. In Academic and Language Skills

Educational Program, there are integrated and game based activities of language, getting ready to literacy and mathematics. Language activities include activities such as getting ready mentally and psychologically for the activity, expressing emotions and thoughts, forming reason-result relationships, developing concept and vocabulary knowledge, conversation, tongue twisters, riddles, storytelling towards reasoning, forming grammatically appropriate sentences, understanding, statement, phonological awareness and awareness of literacy. For the children to develop their reasoning and problem solving abilities and increase their knowledge of natural world, mathematics activities provided opportunities for them to carry out cognitive processes such as numbers, operations, similarity, part-whole relationship, comparison, classifying and separating, ordering, modelling and relationships, geometry and spatial logic, measurement, data collection and analysis. Getting ready to literacy studies included activities towards supporting awareness of phonemes and writing and activities towards completing skills which are taken as a basis in mathematics activities. In order to improve children's cognitive abilities and early academic and language skills, concrete visual materials and worksheets appropriate for the goals were prepared for the activities. Besides, learning methods of question and answer, brainstorming and learning by doing were utilized for the active participation of children. It was paid attention to carry out individual, small and big group studies and recognize every child to talk as much as possible. Open ended questions were prepared in order for the children to express their thoughts overtly at the evaluation stage after the activities. In Academic and Language Skills Educational Program, 40 learning processes in total were prepared to develop children's cognitive abilities and early academic and language skills which were to be administered five days a week throughout an 8-week period. Duration of the activities was planned as 30 minutes. Attention was paid for the activities to have flexibility to be able to be changed according to children's interests and to show difference from routine practices in certain ways. In addition, it was also regarded to create activities that were attention grabbing and that were qualified to teach while having the children enjoy the process. After Academic and Language Skills Educational Program was developed, expert opinion was demanded from three pre-school and child development experts, a curriculum expert and an assessment and evaluation expert. Taking experts' comments and suggestions on training program into consideration, necessary arrangements were carried out and Academic and Language Skills Educational Program was finalized.

4.5. Administration of Academic and Language Skills Educational Program and Collection of Data

General Information Form, related to children in experimental and control groups and their families, was completed by the researcher for each child based on the information available in personal development files at the schools on 11-19 February 2013. In order to assess children's cognitive abilities, "Cognitive Abilities Test Form-6" was administered to children in experimental and control groups as a pre-test on 11-19 February 2013 in compliance with the characteristics stated in the validity and reliability study of the test. The researcher met the children in experimental and control groups through their teachers and socialized with the children to obviate their worries regarding the test administration. In addition, the researcher spent half day at school and participated in activities in the daily schedule in order to have children get used to her. Each sub test was administered to children on different days in compliance with the characteristics stated in the validity and reliability study of the test (e.g. working one to one with each child in a silent and calm setting).

Following the administration of pre-tests, Academic and Language Skills Educational Program was put into practice for the children in experimental group by their own teachers for about 30 minutes a day and five days a week during an eight week period between the dates of 20 February 2013 and 16 April 2013. In the meantime, the children in the control groups followed their regular curriculum. In advance of administration of Academic and Language Skills Educational Program, the researcher informed the teachers in experimental group about characteristics, objectives and acquisitions of Academic and Language Skills Educational Program, what kind of situations they would create to reach the objectives, how to communicate with children, in what kind of setting and with which stimuli this communication would take place and which methods and techniques to use. Training practices took place in children's own classrooms. Besides, each activity that was planned to be carried out each day was explained to the teachers in experimental group the day before and the teachers realized a pilot practice about the activity. The activity which was piloted was administered to

experimental group by the teachers on the following day. Academic and Language Skills Educational Program was administered separately to two classes that have courses in the morning and afternoon sessions in the same day. None of the methods, techniques and materials was applied in control groups. The researcher observed activities in experimental and control groups without any interference and recorded the activities in experimental group that are parts of Academic and Language Skills Educational Program with a camera. The activities were administered individually, or with small or large groups and every child's participation was ensured. Following each activity, evaluation was carried out by asking children questions related to life with which children could express their feelings and thoughts. The questions were related to acquisitions and they were descriptive questions with respect to the content of the activity. This was carried out in order for the children to make new inferences out of acquisitions they had obtained.

After the administration of the educational program, the children in experimental and control groups took Cognitive Abilities Test Form-6 again as a post test on 17-24 April 2013 in the same settings and conditions with the pre-tests.

4.6. Analysis of the data

Data gathered via Cognitive Abilities Test Form 6 and general information form was recorded in individual test registration form. Then the data was transferred to computer and assessed with the help of appropriate statistical methods. In the research, demographic information of children and their parents is presented through frequency and percent values. In order to determine the equivalence between experimental and control groups, pre-test scores of sub dimensions of Cognitive Abilities Test Form 6 were used. The significance of the difference between point averages of groups were tested using independent groups t test. Whether the data from Cognitive Abilities Test Form 6 show normal distribution or not was examined via Kolmogorov-Smirnov test and it was identified that the data showed normal distribution. Pre-test and post-test scores of experimental and control groups regarding sub dimensions of Cognitive Abilities Test Form 6 were used. In this comparison, whether the difference between corrected post-test scores and pre-test scores of groups is significant or not was tested through analysis of covariance (one factor ANCOVA).

5. Findings

The findings of the study which aims to investigate the effect of Academic and Language Skills Educational Program on 61-66 months old children's cognitive abilities are presented below.

Table 1

Independent Groups t Test Results for Pre-test Scores of Experimental and Control Groups Regarding Verbal and Quantitative Sub Dimensions of Cognitive Abilities Test Form 6

| Group | Cognitive Abilities Test Form 6 | n | \bar{X} | sd | df | t | p |
|--------------|---------------------------------|----|-----------|-------|----|-------|------|
| Experimental | Verbal | 32 | 27.88 | 6.409 | 62 | -.611 | .544 |
| Control | Verbal | 32 | 28.72 | 4.467 | 62 | | |
| Experimental | Quantitative | 32 | 24.75 | 6.038 | 62 | -.791 | .432 |
| Control | Quantitative | 32 | 25.91 | 5.653 | 62 | | |

$p < 0.01$

As seen in Table 1, according to independent groups t test results of experimental and control groups regarding verbal and quantitative sub dimensions of Cognitive Abilities Test Form 6, there isn't a significant relationship between pre-test results of children in experimental and control groups with respect to verbal dimension of Cognitive Abilities Test Form 6 ($t = -.611$, $p > .01$) and between pre-test point averages regarding quantitative dimension ($t = -.79104$, $p > .01$).

As a result, it can be asserted that children in experimental and control groups had similar qualifications at the start of training.

Table 2

Average and Standard Deviation Values of Experimental and Control Groups Regarding Post-test Scores Corrected According to Pre-test Scores of Verbal and Quantitative Sub Dimensions of Cognitive Abilities Test Form-6

| Groups | Cognitive Abilities Test Form 6 | n | \bar{X} | sd |
|--------------|---------------------------------|----|-----------|------|
| Experimental | Verbal | 32 | 33,28 | 4,99 |
| | Quantitative | 32 | 32,03 | 4.45 |
| Control | Verbal | 32 | 30.22 | 4.08 |
| | Quantitative | 32 | 26.81 | 5.46 |

Cognitive Abilities Test Form 6 Verbal Battery Total Maximum Points: 40

Cognitive Abilities Test Form 6 Quantitative Battery Total Maximum Points: 40

It is seen in Table 2 that, arithmetic averages of experimental and control groups regarding post-test scores corrected according to pre-test scores of verbal and quantitative sub dimensions of Cognitive Abilities Test Form-6 are 33.28 for experimental group and 30.22 for control group in verbal battery ;and, 32.03 for experimental group and 26.81 for control group in quantitative battery. According to point averages, experimental group has higher average point compared to the control group.

Table 3

ANCOVA Results of Experimental and Control Groups Regarding Post-test Points of Verbal Battery of Cognitive Abilities Test Form-6

| Source of Variance | Sum of Squares | df | Mean Square | F | p | η^2 |
|-------------------------------------|----------------|----------|----------------|---------------|-------------|-------------|
| Pre-Verbal Reasoning | 1064.408 | 1 | 1064.408 | 287.896 | .000 | .825 |
| Group (Experimental/control) | 217.184 | 1 | 217.184 | 58.743 | .000 | .791 |
| Error | 225.529 | 61 | 3.697 | | | |
| Total | 65956.000 | 64 | | | | |

p<0.01

It is given Table 3 that there is a statistically significant difference [$F_{(1,61)}=58.743$, $p<0.01$] between the point averages of experimental and control groups in verbal dimension post-test corrected according to verbal dimension pre-test scores. Bonferroni test results, which is carried out between corrected verbal dimension post-test scores of groups shown in Table 2, indicate that between the point averages of experimental group ($\bar{X}=33.28$) and control group ($\bar{X}=30.22$) in verbal dimension, there is a significant difference in favour of experimental group. Calculated effect size is $\eta^2= .791$. Therefore, when eta-squared value ($\eta^2=.791$) is taken into consideration with respect to administered technique, it is possible to argue that Academic and Language Skills Educational Program administered in experimental group has a wide positive effect on children's verbal reasoning abilities as eta squared value is over .14.

Table 4

ANCOVA Results of Experimental and Control Groups Regarding Post-test Points of Quantitative Battery of Cognitive Abilities Test Form-6

| Source of Variance | Sum of Squares | df | Mean Squares | F | p | η^2 |
|-------------------------------------|----------------|----------|----------------|----------------|-------------|-------------|
| Pre-Verbal Reasoning | 1185.638 | 1 | 1185.638 | 203.040 | .000 | .769 |
| Group (experimental/control) | 586.191 | 1 | 586.191 | 100.385 | .000 | .622 |
| Error | 356.206 | 61 | 5.839 | | | |
| Total | 57379.000 | 64 | | | | |

p<0.01

Table 4 indicates that there is a statistically significant difference [$F_{(1,61)}=100.385$, $p<0.01$] between the point averages of experimental and control groups in quantitative dimension post-test corrected according to quantitative dimension pre-test scores. Bonferroni test results, which is carried out between corrected quantitative dimension post-test scores of groups shown in Table 2, indicate that between the point averages of experimental group ($\bar{X}=32.03$) and control group ($\bar{X}=26.81$) in quantitative dimension, there is a significant difference in favour of experimental group. . Calculated effect size is $\eta^2= .622$. Therefore, when eta-squared value ($\eta^2=.622$) is taken into consideration with respect to administered technique, it is possible to argue that Academic and Language Skills Educational Program administered in experimental group has a wide positive effect on children's quantitative reasoning abilities as eta squared value is over .14.

6. Discussion

For the development of children's cognitive abilities, it is significant to administer educational programs in pre-school education institutions supporting children's academic and language skills which are prepared by integrating activities such as language, getting ready for literacy and mathematics based on research, discovery, problem solving, reasoning and playing games. In this research which aims to investigate the effect of Academic and Language Skills Educational Program on 61-66 months old children's cognitive abilities, it is determined according to the results of independent groups t test carried out for pre-test scores of experimental and control groups in verbal and quantitative dimensions of Cognitive Abilities Test Form 6 that there is not a statistically significant difference between verbal dimension pre-test point averages and between quantitative dimension pre-test point averages of children in experimental and control groups. However, it is identified that there is a statistically significant difference in favour of experimental group in post test scores of experimental and control groups in Cognitive Abilities Test Form 6 verbal and quantitative sub dimensions corrected according to pre-test scores. Hence, it can be put forth that Academic and Language Skills Educational Program administered in experimental group has a wide positive effect on children's verbal and quantitative reasoning abilities. In various research in the literature, it is mentioned that educational programs supporting academic and language skills contributes to improvement of children's verbal and quantitative reasoning development. White and Manning (1994) investigated the effect of verbal configuration training towards verbal reasoning abilities of children in pre-school stage on children's ability to figure out the relationship between given situations and make an inference depending on this relationship. In this research, it is determined that children participating in the training can form relationships among analogies and can solve analogy problems more easily. Munro (1998:18) states that training of phonological awareness improves children's verbal reasoning abilities. Kefi (2003) examined traditional programs and High/Scope program in pre-school institutions and investigated which one has more effect on 36-72 month old children's language development skills. In the research, it is identified that language development skills post-test point averages of children in High/ Scope program are significantly higher than language development skills post-test point averages of children in traditional programs. This finding supports the positive effect of training programs, including learning methods and activities that ensure that the child is active, on the children's development. Beck and McKeown (2007)

identified in their research that the vocabulary training program that they themselves developed is effective in developing abilities to comprehend verbal statements and make inference depending on these statements in children of low socio-economic level at pre-school stage. These findings in literature are in parallel with findings in this research regarding the fact that the verbal reasoning ability scores of children in the experimental group have changed positively from the pre-administration to post-administration. In order to develop verbal reasoning ability, it is needed to support abilities such as comprehending verbal statements, matching events and objects, grouping, establishing reason-result relationship and making sense out of rules and principles (Van der Sluis et al., 2007:429–430). The Academic and Language Skills Program administered in the research includes activities towards children's naming and understanding words and concepts, matching and grouping the given objects and events, figuring out the rule regarding the grouped objects, comparing two given verbal propositions, ordering the events, making inferences based on given properties, finding the relationship among verbal statements, completing verbal statements according to relationship and forming verbal reason-result relationships. It is considered that these activities in the training are effective in children's acquisition of verbal reasoning abilities.

The research by Starkey, Klein and Wakeley (2004) on quantitative reasoning abilities of children at pre-school stage aimed to examine the effect of kindergarten mathematics program which consists of activities like arithmetic, quantitative reasoning, spatial reasoning, pattern, non-standard assessment and forming reasonable relationship, on low and middle income families' children. They concluded that mathematics training program highly increased the mathematics knowledge level of children in both socio-economic levels. In their study Kidd, Pasnak, Gadzichowski, Ferral-Like and Gallington (2008) developed a mathematics training program including practices like counting, adding objects, comparing objects by their amounts and ordering the numbers; and, administered this to children at pre-school stage. They stated that the mathematics training program they developed was effective in developing children's quantitative reasoning abilities. Welsh et al. (2010) investigated developmental relationships between growth in domain-general cognitive processes (working memory and attention control) and growth in domain-specific skills (emergent literacy and numeracy) during the pre-kindergarten year, and their relative contributions to kindergarten reading and math achievement. Analyses show that growth in emergent literacy and numeracy skills during the pre-kindergarten year can be predicted by working memory and attention control, and growth in the domain-general cognitive abilities contributes to the prediction of kindergarten math and reading achievement. Research findings highlight the importance of working memory and attention control for academic learning and reveal the effects of early childhood before starting the school. İnal (2011) examined the effect of reasoning training program developed by himself on the cognitive abilities of six year old children; and, identified that there is a significant difference between children in experimental and control groups with respect to verbal, quantitative, non-verbal and overall dimensions of Cognitive Abilities Test Form-6 in favour of children in experimental groups. These findings in literature are in parallel with findings in this research regarding the fact that the quantitative reasoning ability scores of children in the experimental group have changed positively from the pre-administration to post-administration. Quantitative reasoning forms the basis of mathematics and enables children to solve given problems using the concepts and knowledge in their memories (Korb, 2007:3; Umay, 2003:235). In this research, in order to support children's quantitative reasoning abilities, Academic and Language Educational Program includes activities such as recognizing, naming, matching, comparing and ordering regarding mathematical concepts and abilities, processing with numbers and concrete materials, working with part and whole, forming patterns and finding relationships in patterns, naming and matching geometric shapes, saying their properties, placing themselves and objects in appropriate places in a setting, measuring and making graphics based on results of measurement and evaluating, and forming reason- result relationship. It is considered that these activities in the training are effective in children's acquisition of quantitative reasoning abilities.

As a result of this study which aims to investigate the effect of Academic and Language Skills Educational Program on 61-66 months old pre-school children's cognitive abilities, it is determined that the verbal and quantitative scores of experimental group to which Academic and Language Skills Educational Program is administered are higher than the control group.

In the light of the data gathered from the research, a few suggestions are offered below:

- To test the efficiency of Academic and Language Skills Educational Program, pilot schools can be selected and a bigger sample can benefit from this program, so that its results can be tested.
- Academic and Language Skills Educational Program can be administered in pre-school education institutions where children from different socio-cultural levels attend; and, the results could be compared.
- The retention of Academic and Language Skills Educational Program can be followed at the end of the training program in 3-6-12 month periods.

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