The Effect of Piano-Assisted Music Activities on The Mathematical Reasoning Skills of The Preschoolers*

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Extended Summary

Introduction

This research aims to determine the effect of piano-supported music activities on early mathematical reasoning skills of 5-6-year-old preschoolers. For this purpose, in the experimental and control groups of the study group of the research:

1. Is there a significant difference in favor of the experimental group on early mathematical reasoning skills’ pre-test / post-test mean scores?
2. Is there a significant difference in favor of the experimental group on pre-test / post-test mean scores in the measurement sub-dimension of early mathematical reasoning skills?
3. Is there a significant difference in favor of the experimental group on the pre-test / post-test mean scores in data analysis-probability sub-dimension of the early mathematical reasoning skills? questions were intended to be answered.

Method

This research is an experimental study and based on the Ph. D Dissertation of Ceren Doğan at Gazi University, Institute of Educational Sciences (Doğan, 2018). The experimental design of the control group with pre-test and post-test was used. The experimental group has 16 children, the control group consisted of 16 children and the study group had 32 children. After the pre-test was applied to the study group, the control and experimental groups have been formed. The study group was two randomly selected preschool classes from Ankara. The study was done in the spring semester of 2017. Pre-test results, demographics such as gender, age by month, duration preschool education attendance and parental variables have been taken into account in the formation of the control and experimental groups. An eight-week program of piano-assisted music activity plan was developed by the researcher. Each activity duration is 30 minutes. In the preparation process of the activities, eight experts from the fields of music education, child development, curriculum development and preschool education were consulted for the scope validity of the research. In order to ensure the reliability of the activities, an 8-week pilot study was applied to 25 children in the 5-6 age group attending preschool. The "Early Mathematical Reasoning Ability Assessment Tool", developed by Ergül in 2014, was used for data collection. For the data analysis, hypotheses were tested by the Mann-Whitney U test. The experimental group was administered by the researcher for eight weeks and no treatment was applied to the control group. The application is planned to be 8 weeks as 2 days a week within the scope of children's free-time activities. In each application, the duration of the activity is 20 minutes. In order to facilitate children's learning, groups for 5-9 children were studied.

In order to test the effect of PAME, hypotheses were developed. These are:
H₀: There is no significant difference in favor of the experimental group on early mathematical reasoning skills pre-test / post-test score means.

H₁: Early mathematical reasoning skills have a significant difference in favor of the experimental group on pre-test / post-test score means. 16 children were included in the experimental group, and 16 children were in the control group. The experimental and control groups were designed so that the test scores did not differ significantly in all sub-dimensions in the data collection tool.

In this study, Early Mathematical Skills Assessment Tool (EMSAT), (Ergül, 2014, p. 165) was used as a data collection tool. The first study in our country about early mathematical reasoning skills was conducted by Ergül in 2014, and EMSAT was developed. In the referred research, it was aimed to determine the mathematical reasoning skills of preschoolers in measurement and data analysis-probability fields. For this purpose, the first EMSAT was developed, then validity and reliability studies were conducted. In addition, the correlation between mathematical reasoning and variables of age expressed as monthly, type of institution, half-time or full-time attendance, the total duration of preschool attendance, age and educational status of the parents were evaluated. Sample of the validity-reliability study of the scale was selected by random sampling from the community preschools, private kindergarten, daycare center and primary school kindergarten classes in the central districts of Ankara. In the validity-reliability study of the study, 90 children with normal development in the age group of 60-74 months were evaluated. 50 children took part in pre-practice and 40 children took part in the test-retest reliability study. The data were obtained by "EMSAT" and “Information Form” which both are developed by the researcher. As a result of the research; the developed tool was found to be valid and reliable. The application of the tool consists of 40 questions and it is carried out in the form of individual interviews with the participating child. 28 questions include pictures, in 9 questions various materials were used and the remaining 3 questions are directed to children verbally without using any material.

Conclusion
When the pre-test and post-test data of the study group were compared, the control groups’ children showed progress in the tools’ items which are measuring non-standard units, understanding the accuracy of the results, knowing the features of shapes, creating charts, analyzing and predicting the situations in a picture, determining probability. In the experimental group, children developed material on all sub-dimensions of early mathematical reasoning skills. Based on this, PAME, which was administered by a music educator instead of the preschool teacher for eight weeks, was more effective in the development of early mathematical reasoning skills of children.

Suggestions
The fact that music lessons are given by class teachers instead of music teachers in kindergartens and primary schools in our country results in less seeing the benefits of the developmental returns of music activities compared to activities conducted by music teachers. In the discussion section of this study, it was concluded that the teachers perceived self-efficacy perceptions of preschool and classroom teachers about music activities. This research also supports these results due to the fact that the experimental group has shown more progress.