

LEARNING MATHEMATICS THROUGH INTEGRATION OF MUSIC ACTIVITIES

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Abstract

This study examines the impact of music on mathematics learning for first grade students, focusing on the role that rhythm, melody, and musical activities play in the acquisition of basic mathematical concepts. In primary education, especially in first grade, students face challenges in understanding numbers, simple operations, and spatial-temporal relationships. Integrating music into the learning process represents an innovative approach that promotes motivation, concentration, and active involvement of students. The study is based on contemporary pedagogical literature and concrete practices implemented in the classroom, where songs, rhythmic games, and exercises with musical elements are used to reinforce concepts such as counting, comparing numbers, addition, and subtraction. The results show that the use of music has a positive impact on improving memory, developing logical skills, and creating a more engaging and collaborative learning environment. Participants of the study are first grade teacher and professor of music education (authors of the study) 60 first grade students of elementary public school of Gjakova, Kosovo. The methodology of the study is the participatory action research. The intervention program is based music activities. For the study were used qualitative and quantitative data collection techniques: interviews with teachers, and tests and observation. The results from this study will explain that the use of music activities can improve student's skills learning mathematics. In conclusion, the paper emphasizes that music is not just an entertainment tool, but an effective pedagogical strategy that can increase the quality of learning in mathematics in the primary cycle, contributing to the comprehensive development of children.

Keywords: *Musical activities, interdisciplinary, mathematic learning, motivation.*

1. Introduction

Mathematics in the early grades constitutes a fundamental basis for students' further academic development. However, classroom practice shows that many first-grade students face difficulties in acquiring basic mathematical concepts such as counting, comparing numbers, and performing basic operations like addition and subtraction. According to Piaget (1952), children at this age are in the concrete operational stage, where learning is more effective when it is supported by concrete experiences and hands-on activities. This suggests that traditional abstract teaching methods may not always be sufficient for developing mathematical understanding.

In response to these challenges, it is important to use innovative teaching approaches that are appropriate for students' age. One such approach is the integration of musical activities into teaching. According to Gardner (1983), musical intelligence is one of the key forms of intelligence and can be used to support learning in other areas, including mathematics. Music, through songs and rhythmic games, helps develop memory, rhythm, and structure—elements that are closely related to mathematical concepts.

The use of musical activities such as songs and rhythmic games creates a lively and interactive learning environment, increasing student engagement and facilitating the acquisition of abstract concepts. As emphasized by Kemmis and McTaggart (2005), participatory approaches in teaching—based on action and reflection—help improve teaching practices and actively involve students in the learning process.

Studies in the field of education show that music and mathematics are closely interconnected through shared structures such as rhythm, pattern, and temporal organization. According to Collins (2013), musical activities activate areas of the brain that are also involved in numerical processing, positively influencing children's cognitive development.

One of the key aspects of this connection is rhythm. Blythe (2009) emphasizes that rhythmic processing supports the development of basic skills such as sequencing and counting, which are essential for early mathematics. In this context, children who engage in rhythmic activities (rhythm, musical counting, clapping and the use of body percussion(hand and feet)develop a stronger understanding of order and quantity.

Catterall, (2009) argues that participation in the arts, including music, is associated with improved academic performance, particularly in mathematics. He highlights that musical activities help students understand patterns and structures, which form the foundation for operations such as addition and subtraction. Musical elements such as rhythm and melody incorporate mathematical concepts like one-to-one correspondence and patterning, making them effective tools for teaching counting and number comparison in early grades.

Furthermore, Hallam (2010) points out that music has a positive impact on working memory and concentration, which are key factors in learning mathematics. Through songs and rhythmic activities, students reinforce their ability to retain and manipulate numerical information.

Another important contribution comes from Mills (2007), who argues that integrating music into teaching increases student motivation and engagement, creating more favorable conditions for acquiring mathematical concepts such as addition and subtraction.

This study aims to analyze the impact of using musical activities on improving first-grade students' mathematical skills, particularly in counting, comparing numbers, addition, and subtraction. By incorporating songs and rhythmic games into mathematics instruction, the study seeks to increase student motivation, deepen conceptual understanding, and contribute to the development of more effective and inclusive teaching practices. Through this approach, it is expected to increase students' motivation and enhance their mathematical understanding, contributing to the development of more effective and inclusive teaching methods.

2. Method

For this study is used participatory action research method, which emphasizes collaboration, reflection, and continuous improvement throughout the research process (Kemmis & McTaggart, 2005). The role of authors of the study was as active contributors in the research process, helping to identify problems, collect data, implement intervention program and interpret findings. McIntyre (2008) notes that PAR integrates reflection and action, allowing participants to investigate their own realities and implement meaningful change.

The intervention program is based music activities: songs, rhythmic games, and exercises with musical elements. For the study were used qualitative and quantitative data collection techniques: interviews with teachers, pre and post-test with mathematical tasks and observation.

The participants were 60 first-grade students of elementary public school of Gjakova, Kosovo, who were actively involved in music-based learning activities designed to enhance engagement and participation.

2.1. Procedure

The study includes action research phases: planning, action, observation and reflection. McNiff, (2013), views action research as a cyclical process of planning, acting, observing, and reflecting, aimed at improving practice and understanding.

2.1.1. Planning. In the initial phase, the teacher-researcher identified challenges in students' understanding of early mathematics concepts such as counting, comparing numbers, addition, and subtraction. For this phase is used pre-test with mathematical tasks to explore student's knowledge about mathematics. Through classroom observations, students' interests in songs and movement activities were explored. Based on this, an intervention plan was developed that integrated music activities—such as counting songs, rhythm-based number games, and movement exercises—to reinforce mathematical concepts.

2.1.2. Action. The intervention was implemented during regular classroom lessons. Students participated in structured music activities that combined math learning with rhythm and movement. For example, counting songs were used to practice number sequences, while rhythmic clapping and stepping games were used to demonstrate addition and subtraction (e.g., adding beats or taking beats away). These activities aimed to make abstract mathematical concepts more concrete and engaging.

2.1.3. Observation. During the implementation, the teacher-researcher observed students' participation, understanding, and ability to apply mathematical concepts during the activities. Data were collected through, post-test and observation of students' responses to tasks involving counting, comparing numbers, addition, and subtraction.

2.1.4. Reflection. After each session, the teacher-researcher reflected on the effectiveness of the activities in improving students' mathematical understanding. Students were also encouraged to share their experiences and indicate which activities helped them learn best. This feedback supported ongoing evaluation of the intervention.

2.2. Revision and re-implementation

Based on the reflections, the activities were modified to better support students' learning needs. More effective music-based strategies were expanded, while less effective ones were adapted. The revised intervention was then re-implemented, continuing the PAR cycle of planning, action, observation, and reflection (McNiff, 2013).

The music activities are implemented during 3 months and the two first grade teachers and authors worked with students in their classrooms during this time. Researchers collaborated with teacher for changing their student's skills in mathematics: counting, comparing numbers, addition and subtraction and developing their teaching practices.

2.3. Instruments for data collection

Data collection instruments were tests (pretest and posttest), observation and interviews with teachers. Pretest was implemented before the action plan and posttest after the action plan in order to evaluate the impact of music activities for student's skills in mathematics, and interviews with teachers were conducted in the planning phase to identify student's difficulties in mathematics. Observation was conducted during the planning and action phases: in the planning to identify student's difficulties in mathematics, during the action to identify action process.

2.4. Sample

Participants of the study were 60 first grade students, 28 students from class I-1 and 32 students from class I-2 (age 6-7 years old), IVA ($M=6.62$; $SD=0.48$) and IV B ($M=6.56$, $SD=0.50$) and their two classroom teachers from the "Mustafa Bakija" primary school, from Gjakova, Kosovo.

3. Results

Based on contemporary literature (Collins, 2013; Hallam, 2010; Catterall, 2009), musical activities such as songs and rhythmic games represent an effective tool for developing basic mathematical skills in first-grade students, as they integrate rhythmic and numerical structures, facilitating the learning of counting, comparison, addition, and subtraction."

Results showed that the student's achievements in mathematics increased after implementing of action plan. That showed student results in post-test.

The t-test was utilized in order to compare the results of the pre-test and the post-test. There was a significant difference from pretests to posttests in the scores of pretests for class I1 ($M=3.50$, $SD=.839$ and posttest ($M=4.11$, $SD=.956$), $t(27) = -6.450$, $p=.000$ in the class II2 ($M=3.53$, $SD=.983$ and posttest $M=4.03$, $SD=1.031$), $t(31) = -5.568$, $p=.000$ respectively).

4. Discussion and conclusions

The purpose of this study was to analyze the impact of musical activities, such as songs and rhythmic games, on the development of basic mathematical skills in first-grade students, focusing on counting, number comparison, and basic operations of addition and subtraction.

The action plan with music activities has impact on student's skills for mathematic: numbering, comparing numbers, addition and subtraction. The findings of this study are in line with earlier studies Hallam (2010) and Catterall (2009) emphasize that participation in music and the arts has a positive effect on academic achievement, particularly in mathematics, by improving students' ability to understand patterns, structures, and numerical relationships. Overall, the findings of this study indicate that the integration of music in teaching mathematics in first grade:

- enhances understanding of basic numerical concepts,
- supports the development of counting and comparison skills,

- facilitates learning of addition and subtraction through concrete experiences,
- increases students' motivation and engagement in the learning process.

In conclusion, musical activities represent an effective pedagogical tool for supporting early mathematics learning and should be more widely integrated into classroom teaching practices.

The results from the study confirmed that students improve their skills in mathematics when through music activities such as; songs, music games and rhythm. The rhythm helped the students for numbering, songs for addition, subtraction and comparing numbers, music games for comparing numbers, addition and subtraction.

From this, it can be concluded that teachers should use music activities in mathematics lessons to help students to understand better mathematics concepts and operations, especially in early grades. They should prepare lessons based on learning styles and multiple intelligence

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