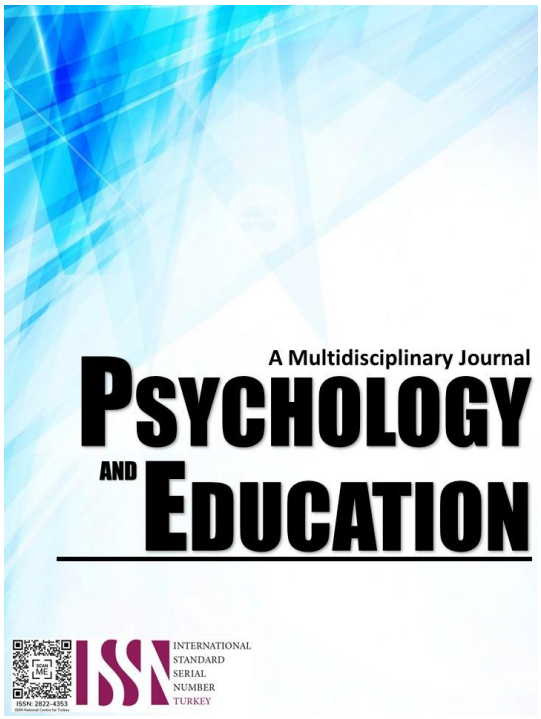
UTILIZING MUSIC IN TEACHING MATHEMATICS



PSYCHOLOGY AND EDUCATION: A MULTIDISCIPLINARY JOURNAL

2023
Volume: 7
Pages: 272-276
Document ID: 2023PEMJ548
DOI: 10.5281/zenodo.7679209
Manuscript Accepted: 2023-22-2

Psych Educ, 2023, **7**: 272-276, Document ID:2023 PEMJ548, doi:10.5281/zenodo.7679209, ISSN 2822-4353

Research Article

Utilizing Music in Teaching Mathematics

Agnes V. Carmona*

For affiliations and correspondence, see the last page.

Abstract

This study determines the effects of teaching mathematics through music in Kindergarten students of Southville 8 Elementary School. Quasi experimental method of research was used. This was accomplished through pre-test and post-test. The participants of the study were two sections in Kindergarten which serves as the control group and experimental group. The participants in this study were chosen conveniently. Result of the study shows that teaching mathematics through music is more effective with respect to the three-mathematics topic: Pitong Araw sa Isang Linggo, Buwan sa Isang Taon, at Oras but still teachers may use expository approach as an alternative for teaching.

Keywords: *music-math interdisciplinary activities, math process abilities, elementary math education.*

Introduction

The evidence clearly indicates that the traditional Mathematics curriculum and instructional methods are not serving students well (Hiebert, 2019). Traditional mathematics instruction that consists of assigning the same problem to every student, lecturing from the textbook, insisting on one way to solve problems, and neglecting conceptual understanding has not only been accused of being the cause for low mathematics achievement but also as the origin of Mathematics anxiety (Furner & Berman, 2018, TIMSS, 2010). One method for teaching Mathematics is to integrate arts into instruction (Betts, 2018). Music is an ideal form of art to be integrated into mathematics instruction. The links between music and Mathematics are very rich and include melody, rhythm, intervals, scales, harmony, tuning, and temperaments. De Los Santos, Carmona, and Macanang (2019) developed music-mathematics interdisciplinary exercises and an alternative model of Mathematics instruction by integrating Music into Mathematics lessons. Multiple intelligence theories and motivation theories contributed to the theoretical framework to determine the effectiveness of the mathematics-music interdisciplinary curriculum and the instructional model. Music is an art of sound that expresses ideas and emotions. It is one way to communicate with one another. Many teachers are using music to engage their pupils in the lesson. It is their way to express the lesson in a creative and meaningful way. Music touches all learning domains, including the psychomotor domain, the cognitive, and in particular and significant ways, the affective domain, including music appreciation and sensitivity. Music training from preschool through post-secondary education is common in most notions because involvement with music is considered a fundamental component of human culture (Tingting, 2011). Teachers can use music to encourage students' participation, especially on the subject that the students are having difficulty with. Since many of the students are having difficulties and show a lack of interest in mathematics subject, music can help teachers gain the student's interest in the lesson (Cruz, 2015).

A global survey ranks the Philippines 115th out of 142 countries in perceived quality of Math education. Philippine math is one more on logical and critical thinking which makes pupils feel bored because it has no modern strategies and they wanted to have something new (Castillo, 2014). A common complaint among math teachers is that students do not know, remember or have sufficient mastery of material they have previously been taught, (Caparo,2013). For many people, mathematics is an enigma.

Characterized by the impression of numbers and calculations taught at school, it is often accompanied by feelings of rejection and disinterest, and it is believed to be strictly rational, abstract, cold, and soulless but if you are going to add something new like music, the mood can be lightened and the student's interest can somehow boost (Courey, 2012). Music, on the other hand, has something to do with emotion, feelings, and with life. It is present in all-day routines (Moravick, 2013). Everyone sang a song, pressed a key on a piano, blew into a flute, and therefore, in some sense, made music. It is something people can interact with; it is a way of expression and a part of everyone's existence. Music can use in managing the class. It can make learners a boost of energy when they felt dull and bored.

The area of focus and interest of this study will be mathematics education for very young children. The researchers think that when a child is young, they need to learn mathematics in a new and existing way. Children need to be shown that mathematics has many applications to real life, and that it can be a challenging, exciting, and fascinating subject. As the Philippine schools struggle to provide adequate educational support in math, the researchers bring music into mathematical teaching, making the subject more relevant and enjoyable for those in early childhood.

Based on the results for the past 3 years 2016-2019 of Numeracy of pupils in Southville 8 Elementary school are low. However, the teachers and school managers of the school work hand in hand to uplift the quality of learning particularly in mathematics. This study determines the effects of teaching mathematics through music to kindergarten students of Southville 8 Elementary School. Quasi-experimental method of research was used. This was accomplished through pre-test and post-test. The participants of the study were two sections in kindergarten which serves as the control group and experimental group. Moreover, this study sought to answer the following questions:

1. What is the performance of the control group and experimental group in the pre-tests with respect to the following topics:
   1.1 Pitong Araw sa Isang Linggo;
   1.2 Buwan sa Isang Taon; and
   1.3 Oras?
2. What is the performance of the control group and experimental group in the post-tests in terms of:
   2.1 Pitong Araw sa Isang Linggo;
   2.2 Buwan sa Isang Taon; and
   2.3 Oras?
3. Is there a significant difference between the performance of the control group in pre-tests and post-tests with respect to the following topics;
   3.1 Pitong Araw sa Isang Linggo;
   3.2 Buwan sa Isang Taon; and
   3.3 Oras?

Literature Review

Based on the study of Capraro (2013) on "Elementary Teachers Integrate Music Activities into Regular Mathematics Lessons: Effects on Students' Mathematical Abilities". His study presented exploratory research investigating the way teachers integrate music into their regular mathematics lessons as well as the effects of music mathematics interdisciplinary lessons on elementary school student's mathematical abilities of modeling, strategy and application. In his study, two teachers and two classes of first-grade and third-grade students participated in the present study. The two teachers in his study designed and implemented music activities as an integrated part of their regular mathematics lessons across five weeks. According to him, the results demonstrated that both teachers integrated a variety of music activities with different mathematical content. He emphasized that the music-math interdisciplinary lessons had positive effects on multiple mathematical ability areas.

According to the study of Castillo (2014) conducted a study on the effects of music on the spatial reasoning skills of grade one pupils. His study determined the significant effect of different types of music on the spatial reasoning skills of children aged 6-8 years old. He selected twenty-one grade one students of Colegio de San Juan de Letran to complete a jigsaw puzzle to assess their spatial reasoning skills while exposed to two different conditions: Instrumental Music the Binaural Beats and Nursery Rhymes the Old McDonald's, respectively. The results of his study were all calculated using Wilcoxon's Matched-Pairs Signed Rank Test. Findings imply that nursery rhymes stimulate the brain's processing of organizing images more effectively than that of instrumental music. He stated that children ranging from 6-8 years old are more likely to perform better on a spatial reasoning task when they are listening to fast-beat nursery rhymes than that instrumental music; thereby enhancing their spatial reasoning skills.

Courey's (2012) study looked into the relationship between music in analyzing mathematical concepts. He stated that listening to music mainly activates the right brain hemisphere and the left hemisphere will analyze what we have heard. With respect to it, he said that if the two brain hemispheres will be involved, music can help in analyzing mathematical concepts, and activating the whole brain ensures better retention.

Based on the study of Geith (2012) research on music and music therapy suggest that math and music are related in the brain from very early in life. He discussed musical elements such as steady beat, rhythm, melody, and tempo possess inherent mathematical principles such as spatial properties, sequencing, counting and patterning, and one-to-one correspondence. He intended that music also seems to be related to very primal parts of the brain. Our bodies cannot help but react physiologically to music input. His research implies that even the youngest children

have the potential to inherently respond to music and the mathematical construct it contains.

"There may be no more powerful method of learning than through music, and no more important lessons for children than those that focus on character and social and emotional skills," (Grohol, 2013). McMannis (2013) discovered in his research that the songs he uses in the study and accompanying activities have a positive effect on kids' school performance, social relationships, and conflict resolution. Specifically, his study involved 320 first- and second-grade students from 16 classrooms in Santa Barbara and Goleta, Calif. schools. In his study kids were given a CD, and then received nine lessons using songs and activities from trained college students also said that, "Pleasurable experiences with songs involve brain circuitry associated with pleasure, reward, and emotion, such as the ventral striatum, midbrain, amygdala, orbitofrontal cortex, and ventral medial prefrontal cortex,". He pointed out that music is a great way to engage your kids in powerful lessons, such as teaching them social and emotional skills. As a recent meta-analysis found, these skills help boost academic performance; improve problem-solving and decision-making; and reduce conduct problems and emotional distress.

Based on the study of Schlaug (2014) on the relationship between music and phonological processing, he said that music and language skills are related in normal-reading children as well as in children with dyslexia. He stated that in both an ongoing longitudinal study with normal-reading children and a pilot study with children with dyslexia, he found a strong relationship between musical discrimination abilities and language-related skills. In his study, the normal-reading children, musical discrimination predicted phonological and reading skills. These relationships were stronger in children with music training than in control children without music training. In children with dyslexia, musical discrimination predicted phonological skills, which in turn predicted reading abilities. Furthermore, he explained that normal-reading children with music training surpassed both normal-reading controls and children with dyslexia in melodic discrimination. Controls also outperformed children with dyslexia. Taken together, his study findings suggest that a music intervention that strengthens the basic auditory music perception skills of children with dyslexia may also remediate some of their language deficits.

Smith (2013) said that many traditional songs and nursery rhymes contain themes that encourage language learning in mathematics. She claimed that children learn naturally while enjoying a wonderful medium. He gives examples of math language that can learn in some traditional songs like, up and down for the song "Eency Weensy Spider", over the mountain for "The Bear Went Over the Mountain", and the other side, on the back of the crocodile and inside the crocodile for "The Crocodile Song", and cold-hot for "the Three Bears".

Methodology

Participants

The participants of the study will be the two sections of Kindergarten of Southville 8 Elementary School during the school year 2021-2022, with a grand total number of 60 participants.

Instruments of the Study

At the outset of the study, the researchers engage in gathering information related to the research variables. The bodies of information that will be gathered will provide the researchers with additional insight into the instrument used in gathering data. The researchers will select the participants of the study and teach three lessons, one lesson per day which are Pitong Araw sa isang Linggo, Buwan sa isang Taon, and Oras for three consecutive days. There is a pre-test and post-tests, one pre-test and one post-test per topic. The same test contents will be given in both the control group and the experimental group.

Sampling

In this study, the researchers will be using convenience sampling to choose what sections where they are going to conduct the study and to get and identify their subjects. According to UNESCO, convenience sampling is sometimes referred to as 'accidental samples' for the reason that elements may be drawn into the sample simply because they just happen to be situated, spatially or administratively, near where the researcher is conducting the data collection. The main assumption associated with convenience sampling is that the numbers of the target population are homogeneous. According to Fraenkel, Wallen and Hyun (2012) that many times it is extremely difficult, and sometimes even impossible to select either a random or a systematic nonrandom sample. At such times, a researcher may use convenience sampling. Even if there are many disadvantages to using convenience sampling, the researcher still used it

because the subjects are conveniently available for study.

Procedure

At the outset of the study, the researchers engage in gathering information related to the research variables. The bodies of information that will be gathered will provide the researchers with additional insight to the instrument used in gathering data. The researchers will select the participants of the study and teach three lessons, one lesson per day which are Pitong Araw sa isang Linggo, Buwan sa isang Taon, and Oras for three consecutive days. There is a pre-tests and post- tests, one pre-test and one post-test per topic. Same test contents will be given in both control group and experimental group. The test comprised with 10 questions. The test will be administered into two schedules, pre-test before teaching and the other one is the post-test after the instruction. The researcher who will be assigned in teaching will also the one who will administer the pre-test and the post-test in both control and experimental group. The same lesson plan will be used on both groups, the only difference is the way the topic will be delivered. The instruction to control group will be given (presenting the math lesson without the use of music) right after the experimental group (using music in presenting the lesson). The pre-test of both groups will be administered on the day before the instruction. It measures the knowledge of the students regarding the topics. The post-test will be administered right after the instruction. It is to determine if there was an increase of knowledge about the subject matter. After conducting the test, checking of papers. The gathered data will be subject to statistical treatment.

Ethical Considerations

Participation of the respondents in this study will be voluntary. The respondents' right not to participate at any point will be respected. All the data gathered will be kept highly confidential. The survey questionnaire to be used in this study is design to help ensure trust and respect among respondents, individual questionnaire will be given to each respondent and writing their names is optional.

Results

The performance of the control group in the pre-test in Lesson 1. Pitong Araw sa Isang Linggo which has mean score 5.98 lower in the results the pos-test which is 7.2 mean score. While Lesson 2 :Buwa sa Isang Taon has a mean score of 5.98 in the pre-test and 7.8 mean score in the post-test. Same with the result in Lesson 3: Oras which has a mean score of 5.2 in the pre-test and 6.95 mean score in the post test.

The performance of the experimental group Lesson 1: Pitong Araw sa Isang Linggo pre-test result has a mean score of 4.5 lower than the post-test result with 8.9 mean score. Lesson 2: Buwan sa Isang Taon pre-test results has 4.96 mean score which much lower tha the results I the post-test with 9. 14 mean score. Lesson 3: Oras has 6.76 mean score in the pre-test while post-test has a result of 9.8.

The result of t-test the performance of the control group in Lesson 1: Pitong Araw sa Isang Linggo showed that the t-value of 6.73 is greater than the critical value of 1.685 at 0.05 level of significance. There is a significant difference on the results. Lesson 2: Buwan sa isang Taon showed significant difference since the t-value of 6.77 is greater than the critical value of 1.685 at 0.05 level of significance. Same with Lesson 3: Oras which reveal that the t-value of 9.13 is greater than the critical value of 1.685 at 0.05 level of significance. There is a significant difference on the results.

The result of t-test on the performance of the experimental group in Lesson 1: Pitong Araw sa isang Linggo shows that the t-value of 14.14 is greater than the critical value of 1.685 at 0.05 level of significance. There is a significant difference on the results. Lesson 2: Buwan sa isang Taon shows a significant difference since the t-value of 14.82 is greater than the critical value of 1.685 at a 0.05 level of significance. Lesson 3: Oras reveal that the t-value of 9.52 is greater than the critical value of 1.685 at a 0.05 level of significance and there is a significant difference in the results.

The result of the t-test on the performance of the control group and of the experimental group in pre-tests in Lesson 1: Pitong Araw sa isang Linggo shows that the t-value of 2.76 is greater than the critical value of 1.991 at 0.05 level of significance. There is a significant difference in the results. Lesson 2: Buwan sa isang Taon shows an insignificant difference since the t-value of 1.25 is lower than the critical value of 1.991 at 0.05 level of significance. Same with Lesson 3: Oras which shows that the t-value of 1.21 is lower than the critical value of 1.991 at a 0.05 level of significance. There is no significant difference in the results.

The result of the t-test on the performance of the control group and of the experimental group in post-

tests in Lesson 1: Pitong Araw sa isang Linggo showed that the t-value of 5.18 is greater than the critical value of 1.991 at 0.05 level of significance. There is a significant difference in the results. Lesson 2: Buwan sa Isang Taon shows a significant difference since the t-value of 5.37 is greater than the critical value of 1.991 at a 0.05 level of significance. Same with Lesson 3: Oras which shows that the t-value of 8.28 is greater than the critical value of 1.991 at a 0.05 level of significance. There is a significant difference in the results.

Discussion

The data above shown that: There is an increase happen in the scores from their pre-test and post-test in the performance of control group with respect to the three mathematics topics. Experimental group have an increment with respect to their pre-test and post-test in three mathematics topics. There is a significant difference in the pre-test and post-test of control group with respect to the three mathematics topics. There is a significant difference in the pre-test and post-test of experimental group with respect to the three mathematics topics. There is a significant difference in the pre-tests of the control and of the experimental group on Lesson 1. But hence, lesson 2 and 3 shows that there is no significant difference in the pre-tests of the control and of the experimental group with respect to the three mathematics topics. There is a significant difference in the post-tests of the control and of the experimental group with respect to the three mathematics topics.

Conclusion

School Administrators may use this data and incorporate music in teaching mathematics and expository approach to have a variety of teaching method or combine it with other teaching strategies to make it more effective based on the need of the situation. Teachers may use music in teaching mathematics and expository approach alternately to have a variety of teaching method or combine with other teaching strategies to make it more effective. Parents may easily help their children on the mathematics lessons and assignment with the help of music. They can sing together with their children to improve their retentions skills as well as enjoying their moment together. Students may actively participate on their mathematics subject. It will improve their retention skills and achieve good academic performance in their mathematics subject. For future researchers a parallel study should be conducted but change your research design. They could also use a different subject and different strategies.

References

Brown, T. (2013). Primary Students Teacher's Understanding of Mathematic and its Teaching. British Educational Research Journal, Vol.25, Issue3, pp. 299-322 DOI.10.1111/j.1949-8594.00011x.

Capraro, M., & Cruz, M. (2015). Elementary Teachers Integrate Music Activities into Regular Mathematics Lessons: Effects on Students' Mathematical Abilities. A Research Journal on Arts Integration in Schools and Communities Permalink, pp.27-30.

Castillo. (2011). Kinder music in the Philippines. Retrieved 2011, from www.kindermusic: http://www.kindermusik.com/mindsonmusic/kindermusik/a-minds-on-music-qoute-6

Castillo, D. B. (2014). The Effects of Music on the Spatial Reasoning Skills of Grade One Pupils. International Journal of Learning, Teaching and Educational Research, Vol. 1, pp. 73-83.

Cirillo, M. (2011). Mathematics would say it this way: An Investigation of Teachers 'Framing of Mathematics. School Science and Mathematics, Vol. III, Issue 2, pp 68-78 DOI: 10.1111/j.1949-8594.2011.00062.x.

Courey. (2012). Academic Music: Music Instruction to engage third-grade students in learning basic fraction concepts. Educational Studies in Mathematics, pp. 1-18.

Forged, M.& Fraenkel et al. (2012). The Relation Between Music and Phonological Process in Normal Reading Children and Children with dyslexia, Music Perception. An interdisciplinary Journal.

Geith.W. (2012).Early Career Challenges in Secondary School Music Teaching. British Educational Research Journal, Vol.37.Issued 2, pp. 285-315 DOI:10.1080/01411921003596903.

Moravick, E. (2013). Meaningful for Curriculum for Young Children. United States: Pearson Education Inc.

Smith III, J. (2010). Efficacy and Teaching Mathematics by telling: A Challenge for Reform. Journal for Research Mathematics Education, Vol. 27 No. 4, pp. 387-402.

Tingting, (2011).Preservice Teacher's Beliefs and Attitudes about Teaching and Learning Mathematics through Music an Intervention Study. Educational Studies in Mathematics pp.236-248

Affiliations and Corresponding Information

Agnes V. Carmona, Ed D
Casili Elementary School,
Department of Education - Philippines