

The Effects of Music towards the Mathematical Language Development of Children

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ABSTRACT

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Mathematical programs should enable children to use mathematics as a tool to explore, find knowledge and solve problems as well as develop language. Mathematical abilities are the basis of the skills required for the Basics of children's mathematical development starting from the experience of children related to concrete bends or objects containing quantities and qualities of objects such as different colors, sizes, and shapes as well as the numbers around them. Thus, this research successfully identified three main objectives such type of music can increase children's mathematical development, the effect of music on children's mathematical development in terms of cognitive and literacy and to identify challenges and barriers toward mathematical children's development. As can be concluded, music does a lot of good to the mathematical development of children. Which is a factor influencing the development of a child's mathematical language.

Contribution/Originality: The main contribution of this study is to identify the effects of music on the mathematical language of children. This study has also successfully unraveled the benefits of learning mathematics for children to develop analytical, deductive thinking and the ability to reason and make conclusions.

1. Introduction

Children's mathematical language is a language that exists in everyday speech. Children enjoy, listen and talk about mathematics in a natural setting of music. This method is able to give children an understanding of the symbols and procedures to help them understand mathematical logic. Björklund, van den Heuvel-Panhuizen and Kullberg (2020) said Mathematics is a field that applies a matter of quantity, estimation, equation, difference, comparison, order, match, measure, shape, pattern, space, time, position, and plus. Many individuals think that mathematics subjects are difficult to understand but different. For young children, the initial mathematical concept is an understanding of the shape, quantity, space, dimension or position, pattern, time, the beginning of the number, representation of numbers, and operation of numbers.

Based on article of Liulingzi, Pattananon and Khunthongchan (2023) explains that Music is also seen too often combine kinesthetic, auditory, and visual elements. Singing has a specific objective and should be done in a simple language style, with short lyrics appropriate to the development of the child's language. Music and singing also involve the development of a language that can stimulate the child's mind in the learning process. In addition, music can also help children replenish vocabulary through lyrics that have new words with aspects of peaches, tempo, rhythm patterns, and melodies, children find it easier to learn and remember new words.

Early mathematics is essential to build the foundation of mathematical and logical thinking to improve early childhood cognitive thinking. Therefore, this study was conducted to identify problems in mathematics which is to identify what type of music can increase children's mathematical development. Next, the study also identified the effect of music on children's mathematical development in terms of cognitive and literacy as well as identified challenges and barriers to mathematical children's development.

1.1. Research Problem

According to Bath, Daubney, Mackrill and Spruce (2020) the effect of using music in children's mathematical language is that children are not focused or disproportionately on learning because they are obsessed with music. Obsession or fanaticism is a characteristic that has existed in humans since time immemorial. It means an outrageous or extreme attitude in a holding or stance. Children who are obsessed with music will cause them to neglect to work on tasks that have been assigned to them. However, excessive use of time to listen to music will result in a fanatical feeling toward the song until the child is able to perform the assigned tasks. The adverse influence of the songs heard will make the children obsessed and not engage in outdoor activities such as leisure and social activities with their peers. Listening to music is still relevant and encouraged to inject positive feelings into emotions. Music can change an individual's self but don't let it swallow us to the point of falling into negative influences.

Masnan and Mohamed (2023) said the effect of using music in children's mathematical language is Music exposure in Malaysia is still decreasing. This can be proven that children who attend school in the countryside do not know how to play instruments, and there are no gadgets and televisions that can be a source for children to get to know music and instruments. Compared to overseas, Singapore has state-of-the-art equipment dedicated to children's development in terms of music exposure and instruments. The advantage of children learning music and instruments can be proven when music and

singing activities at school enable children to process information quickly during the learning process by listening to songs and solving problems in mathematics. For example, solving a number operation in early mathematics by singing a song. Music can also change techniques and improve children's teaching and learning.

Imam Koning and Nasrifan (2021) said the effect of using music in children's mathematical language is that children are too dependent on music every time a learning session is conducted. The constant use of music makes children too dependent on music if they want to ease and relieve all the stress they face. This may cause them to be negligent in doing their day-to-day tasks if they rely too much on music in relieving stress. For example, a child who will listen to music as a therapy to relieve stress may be negligent with his task when overly dependent on music. When a pupil has mastered socioemotional skills, the student's involvement will increase and increase the level of academic achievement.

Article of Yie, W and Ying (2017) stated that the challenges and obstacles to the use of music are that music education programs are far removed from planning in schools. This has led to children's right to learn music and develop artistic talent because not all schools offer music lessons. Moreover, issues related to the competence of teachers and their failure to play a good role as an impetus to promote music education are sorely lacking. The use of music in education received less support and encouragement in providing a good picture from the general public of the value and importance of music education, despite being given enough opportunities.

According to Mazana, Suero Montero and Olifage (2019) there is a challenges and barriers to mathematical children's development are the attitude of children who are not interested in the subject of mathematics. Most children consider mathematics a difficult subject to achieve the score target and say this mathematics subject is boring. This leads to less concentration while the teacher is teaching and no replay as soon as the topic is over. Some of the children do less training such as the extra training provided by teachers. Therefore, the task of this mathematics teacher is very heavy in making the subject of mathematics a subject that children are interested in. The first step that can be done is to increase the use of creative teaching aids and diversify teaching techniques.

Lastly, challenges and barriers toward mathematical children's development are the challenges of teachers in adapting to the development of the globalization era in the use of increasingly sophisticated tools in teaching sessions. The use of ICT in the process of teaching and learning has a negative effect on children (Öçal, Halmatov & Ata, 2021). Through the use of ICT tools can be applied using tools such as PowerPoint, flash, video, and visuals and teachers only need to apply the tools to the children's learning process. However, there is an issue that some teachers are unable to apply the use of ICT in children's teaching and learning sessions. This will result in the fact that the teaching and learning process will be fully focused on lectures only so that children do not have the opportunity to learn mathematics subjects using the ICT that has been implemented in each school.

1.2. Research Objectives

Three research objectives have been identified in this research as follows:

- 1) To identify what type of music can increase children's mathematical development.
- 2) To identify the effect of music on children's mathematical development in terms of cognitive and literacy.
- 3) To identify challenges and barriers toward mathematical children's development.

2. Literature of Research

The use of mathematical language can teach kids to communicate orally more frequently ([Sarudin, Ismail, Yusof, Redzwan, Osman & Hermandra, 2022](#)). Language serves as both a human intermediary and a tool for conversation. The teaching and learning process in the classroom is the most significant social interaction in schools, so daily speech-language is used as a communication instrument there. This is so because instructors talk to students one-on-one almost every day. The goal of teaching and learning is primarily to mold students' behavior and language. One of the fundamental components of human socialization is communication. The information and experiences that the Malay community passes down and shares are referenced in words spoken in mathematical language. The language used serves as a symbol of societal reality. According to [Ompok \(2021\)](#) teaching methods such as games, number books and worksheets are the main contributors to the improvement of early math skills among preschool children. Therefore, the aspect of mathematics is very important to be given priority in teaching children.

2.1. Types of music which can increase children's mathematical development

According to [Svalina and Vukelić \(2020\)](#) said the relationship between the components of this subject of mathematics and music can determine the possibility of integrating into early childhood education learning basic mathematical concepts, where the development of the intellectual capacity of each child depends on the early age. He also said that by combining both mathematical and musical components, the teacher can evaluate his relevance in terms of symmetry, value, and size as well as object recognition. For example, children are able to cross in rhymes or songs to help them learn both the notion of numbers and mathematical operations such as plus or minus. If the teacher combines games with mathematics and music is able to improve productivity, rhythm, and melody in the process of early childhood mathematical thinking receive information.

Based on [Svalina and Vukelić \(2020\)](#) and [Stiller \(2023\)](#) the type of music in childhood education is Childhood education can develop their musical abilities by singing, acting out rhymes, actively listening to music, playing rhythmic and melodic instruments, and expressing themselves musically. At this age, children are introduced to musical ideas through a method that is suitable for preschoolers. These ideas relate to the expressive components of a piece of music (rhythm, tempo, dynamics, tone, melody, and harmony). The tone is created by the proper vibration of sound sources, in contrast to the sounds that encircle us in nature, which result from the incorrect vibration of elastic bodies. Dynamic and tempo The four basic tempos slow, moderate, rapid, and very fast are used to categorize each composition.

According to [Hasibuan, Saragih and Amry \(2019\)](#), the ability to solve mathematical problems depends on a person's understanding of how to combine the components of the problem into a learned "problem scheme" theoretically. A problem scheme is a map stored to solve certain types of mathematical problems that are activated when listening, reading, or symbols, words, and sentence structures. After the problem scheme has been

activated, the student must perform a certain set of procedures and steps to solve the problem. There are at least four broad linguistic competencies that can impact the ability to build, reading comprehension, knowledge of vocabulary, the ability to switch between the way words are used in mathematics as well as knowledge of symbols and formalities.

2.2. The Effects of music on children's mathematical development: Development of cognitive and literacy.

[Imam Koning and Nasrifan \(2021\)](#) is of the opinion that the positive effect of music on children's mathematics is to make teaching and learning activities in the classroom easy and enjoyable. This interaction of music can be seen when children experience pleasure in music when it is able to solve problems, especially in mathematics. For example, learning mathematics using musical elements can provide children with an understanding of mathematics in interesting ways and techniques and children can recognize numbers naturally through experiences in everyday life.

According to [Janurik and Józsa \(2022\)](#) the positive effect of music on the development of children's mathematical language is that it can improve children's cognitive skills. Daily spoken language is used in schools as a means of communication because the process of teaching and learning in the classroom is the most influential social interaction in the school. Cognitive skills are the ability of the individual to think, be independent, and give an opinion. This can be proved when musical and singing activities at school allow children to quickly process information during the learning process by listening to songs and solving problems in mathematics. Finally, the effect of music on children's mathematical language improves teaching and learning methods while in the classroom. The use of music and singing is seen as a useful pedagogical tool for teachers especially when teaching in the classroom. These pedagogical instruments as music and singing can help the social development of the child.

The negative effect there is teachers are uncomfortable teaching music. According to [Imam Koning and Nasrifan \(2021\)](#) the teacher is not ready to plan progress in music and struggles with assessing the competence of children. The use of music in mathematics subjects will take quite a long time because the teacher's children focus on learning otherwise the children focus only on the music they listen to. This situation causes some students to weakly master the subject. Music programs and further research are needed to investigate whether such programs delivered by teachers on a regular basis, not just as an intervention, are still beneficial for math learning.

Using music in children's mathematical language is that children are too dependent on music every time a learning session is conducted. The constant use of music makes children too dependent on music if they want to ease and relieve all the stress they face. This may cause them to be negligent in doing their day-to-day tasks if they rely too much on music in relieving stress ([Adachi, 2021](#)). For example, a child who will listen to music as a therapy to relieve stress may be negligent with his task when overly dependent on music. When a pupil has mastered socioemotional skills, the student's involvement will increase and increase the level of academic achievement.

2.3. Challenges and Barriers to mathematical children's Development.

According to [Timmons, Cooper Bozek and Braund \(2021\)](#) the challenges and barriers to mathematical children's development are a method of delivering teacher teaching in

creating an interesting learning environment. Teachers have an important role to play in creating a fun learning environment for the development of children. Among the roles of teachers is to attract children to learn things including mathematics and to choose the appropriate instruments in using the children's teaching and learning pedagogy. If a teacher's teaching delivery method is poor which makes it difficult for teachers to communicate with children, this is because delivery methods are difficult to understand and children get bored if teaching methods are not diversified. Such situations become an obstacle to the learning objectives not achieved according to the learning syllabus.

The challenge in teaching Mathematics is related to the student's views on the subject of Mathematics itself. Indeed, children will learn this subject from the very beginning. Most of them consider Mathematics to be critical, difficult, and a subject to achieve the proper score target. children talk about math as a difficult and boring subject. [Guerrero \(2022\)](#) stated that the mathematics plays an important role in the development of skills, and the mathematical process should permeate all learning and teaching activities. This includes connecting, communicating, reasoning, arguing, permitting, representing, problem-solving, and generalizing. Teachers should be good at attracting students to what they have been taught as well as finding the easiest way so that what is taught can be well understood by the students. Pupils should not feel depressed, bored, and even hateful of Mathematics ([Machaba, 2021](#)).

The next challenge is the challenge of technological sophistication that is accelerating day by day. Based on article of [Öçal, Halmatov and Ata \(2021\)](#), good math teachers should apply the use of technology and ICT in teaching to make it more attractive and highly innovative. Mathematics Teachers should equip themselves and enhance their self-sufficiency in the knowledge of technology as the world progresses. Globalization demands the challenge of developing knowledgeable workers who are literate and proficient in the use of information and communication technology (ICT). It is important for teachers to present a deep understanding of how children's mathematical concepts often evolve over time and that specific experiences promote children's discovery and conceptual evolution.

According to [Omar, Saad and Dollah \(2017\)](#) and [Lavidas, Apostolou and Papadakis \(2022\)](#) the challenges and barriers to mathematical children's development are teachers do not have enough time to build or prepare teaching aids. This can be evidenced by the teacher's time management focusing only on teaching and learning activities involving worksheets. Teaching aids are the equipment used by the teacher in assisting him in delivering the lesson. Teachers should play their best role in administering and managing the teaching aids they will use and not over-emphasizing the content of learning standards that only focus on classroom teaching, teachers should balance play while learning in children. This is because teaching aids are able to stimulate and develop children's intelligence.

[Rich \(2021\)](#) said the challenges and barriers to mathematical children's development are a lot of teaching syllabus and the pressure the administrators to spend syllabus. A syllabus is a learning syllabus consisting of various subjects based on the national preschool standard curriculum. In this aspect, the teaching syllabus must be timely and have a set of criteria or quality of learning and measurable achievement of each content standard. This situation resulted in the teacher having to complete the syllabus according to the time given by the administrator. The impending effect is that some students are unable to follow and understand the concept of learning.

3. Discussion

This research is based on the title "The effects of music towards the mathematic language of children" was conducted to identify what types of music improve children's mathematical development, to identify the effect of music on children's mathematical development in terms of cognitive and literacy and this study to identify challenges and barriers toward mathematical children's development. This research is only limited to Sabah and there are a number of facts that support this research through the source of articles from abroad to achieve the objectives of the study as well as the problems of the studies by the researchers.

In my opinion, the first aspect of music is rhythm, which is applied to everything in music that has to do with time. An intriguing rhythm can pique children's interest in learning. Children's songs performed in the classroom or at home, for example, can encourage children's interest in learning new things, such as improving literacy rates among children and being able to recognize the sounds of numbers and words. Music can help children's language development because they listen and can discern the rhythm of the music. The use of music by children can also enhance their mental capabilities.

Therefore, mathematics is a core subject that provides early mathematical experience including pre-number, number concept, number operation, money value, time and time concept, form, and space to children. This research would lead to foster an interest in mathematics through various activities and daily experiences of children, master basic mathematical concepts and be able to improve thinking and problem-solving skills. Another reason to study mathematics is that it is a difficult topic. The subject that tests this mentality, although many students do not like it, the process of solving this problem makes us hopeless to get the right answer. Lastly, mathematics is indispensable in our daily lives especially in facing the challenges of modern theology so much that this subject is studied by all human beings

4. Conclusion

Mathematical subjects are core subjects that provide early mathematical experience including prenumbers, number concepts, number operations, money values, time and time concepts, forms, and spaces to children. This subject is able to foster an interest in mathematics through various activities and daily experiences of children, master basic mathematical concepts and be able to improve thinking and problem-solving skills. Language is also one of the main aspects of human socializing. Words spoken in the use of mathematical language refer to the knowledge and experience conveyed and shared by the Malay community. Language ability, particularly verbal consent, is a sign that a nation upholds that culture. the verbal abilities' greater and more significant influence on young students. The mastery of students' verbal abilities in the classroom is facilitated by effective verbal interaction. A reaction between two or more people, interaction is an active action or relationship with one another. Singing can have an impact on how a child develops their mathematical language, which is a component that influences this process. There are many advantages to learning mathematics to advance one's career. The program is also used in real life, so it's great if you can get a handle on this subject. You simply need to practice your math skills casually and with confidence.

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Conflict of Interest

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References

- Adachi, M. (2021). The role of the adult in the child's early music socialization: A Vygotskian perspective. *Visions of Research in Music Education*, 16(5), 25.
- Bath, N., Daubney, A., Mackrill, D., & Spruce, G. (2020). The declining place of music education in schools in England. *Children & Society*, 34(5), 443-457.
- Björklund, C., van den Heuvel-Panhuizen, M., & Kullberg, A. (2020). Research on early childhood mathematics teaching and learning. *ZDM*, 52, 607-619.
- Guerrero, A. L. (2022). *Early Childhood Leaderships' Perceptions of Developmentally Appropriate Instruction*. (Doctoral dissertation), The University of Texas at San Antonio.
- Hasibuan, A. M., Saragih, S., & Amry, Z. (2019). Development of Learning Materials Based on Realistic Mathematics Education to Improve Problem-Solving Ability and Student Learning Independence. *International Electronic Journal of Mathematics Education*, 14(1), 243-252.
- Imam Koning, S., & Nasrifan, M. N. (2021). Integrasi aktiviti muzikal dalam pengajaran dan pembelajaran matematik: Satu kajian literatur. *Jurnal Pendidikan Bitara UPSI*, 14, 92-102.
- Janurik, M., & Józsa, K. (2022). Long-term impacts of early musical abilities on academic achievement: A longitudinal study. *Journal of Intelligence*, 10(3), 36.
- Lavidas, K., Apostolou, Z., & Papadakis, S. (2022). Challenges and opportunities of mathematics in digital times: Preschool teachers' views. *Education Sciences*, 12(7), 459.
- Liulingzi, X., Pattananon, N., & Khunthongchan, P. (2023). The multi-sensory teaching practice for primary music classroom in China. *Journal of Modern Learning Development*, 8(2), 431-438.
- Machaba, M. M. (2021). Grade 3 Mathematics Barriers: Why Learners Experience Them? *Ilkogretim Online*, 20(1).
- Masnan, S. B. A., & Mohamed, S. (2023). The Teacher's Level of Knowledge and Skills in carrying out Music and Movement Activities for Preschoolers. *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, 8(3), e002194-e002194.

- Mazana, Y. M., Suero Montero, C., & Olifage, C. R. (2019). Investigating students' attitude towards learning mathematics. *International Electronic Journal of Mathematics Education*, 14(1), 207-231.
- Öçal, T., Halmatov, M., & Ata, S. (2021). Distance education in COVID-19 pandemic: An evaluation of parent's, child's and teacher's competences. *Education and Information Technologies*, 26(6), 6901-6921.
- Omar, M. S., Saad, N. S., & Dollah, M. U. (2017). Use of auxiliary materials teaching primary school math teachers: The use of teaching aids primary school mathematics teachers. *Malaysian Journal of Science and Mathematics Education*, 7(1), 32-46.
- Ompok, C. C. (2021). Penggunaan Kaedah Permainan, Buku Nombor dan Lembaran Kerja dalam Pembelajaran Matematik Awal Kanak-kanak. *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, 6(10), 235-251.
- Rich, K. M. (2021). Examining agency as teachers use mathematics curriculum resources: How professional contexts may support or inhibit student-centered instruction. *Teaching and Teacher Education*, 98, 103249.
- Sarudin, A., Ismail, S., Yusof, A., Redzwan, H. F. M., Osman, Z., & Hermendra, H. (2022). Peranan Leksis dalam Mengukuhkan Pemahaman Konsep Awal Matematik. *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, 7(9), e001770-e001770.
- Stiller, B. (2023). On the Differences in Children's Singing and Playing of Instruments. In Word Art+ Gesture Art= Tone Art: *The Relationship Between the Vocal and the Instrumental in Different Arts* (pp. 483-494). Cham: Springer International Publishing.
- Svalina, V., & Vukelić, J. (2020). Connecting Mathematics and Music in Preschool Education. *Napredak: Časopis za interdisciplinarna istraživanja u odgoju obrazovanju*, 161(3-4), 411-430.
- Timmons, K., Cooper, A., Bozek, E., & Braund, H. (2021). The impacts of COVID-19 on early childhood education: Capturing the unique challenges associated with remote teaching and learning in K-2. *Early Childhood Education Journal*, 49(5), 887-901.
- Yie, W. K., & Ying, C. M. (2017). Issues and challenges in teaching multicultural musicamongst primary music teachers in Malaysia. *Malaysian Journal of Music*, 6(1), 98-110.