تقييمُ تأثيرِ دمج التِّقنيات الموسيقية والمرئية على مستوى مشاركةِ الأطفال في مرحلةِ ما قبل المدرسة في الأنشطةِ التَّعليمية وتأثيرُ ذلك على نمو قدراتِهم المعرفية

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المُسْتَخْلَص: هدفت هذه الدِّراسةُ إلى استكشاف الفوائد المعرفية المحدَّدة، والتَّعبير العاطفي، والتَّطور الاجتماعي الذي يختبره الأطفال عند تعرضهم للنهج المتكامل؛ ولتحقيق ذلك، تم استخدام المنهج الفينومينولوجي، مع الاعتماد على التحليل الموضوعي للمقابلات شبه المهَيكَلة مع معلِّمات مرحلة ما قبل المدرسة. تم اختيارُ المشاركين من خلال العينة الهادفة لضمان تنوع العينة وتمثيلها حيث أُجْرِيت ما لا يقل عن (٦٠) مقابلةً للوصول إلى تشبُّع البيانات. ومن خلال هذه المقابلات، شاركت المعلماتُ تجاربهنَّ وملاحظاتِهنَّ في الفصول الدراسية؛ مما وفر رؤىً قيمةً حول تأثير دمج العناصر الموسيقية وتقنيات الصُّور في التَّعليم المبكر للأطفال. كشفت النتائجُ أنَّ دمج الموسيقى وتقنيات الصُّور يعزِّز بشكلٍ كبيرٍ من مشاركة الأطفال في عملية التعلُّم ونشاطهم في رياض الأطفال. حيث يعمل الجمع بين الصور التَّفاعلية والموسيقى على جذب انتباههم؛ مما يحفزهم على المشاركةِ الفعَّالة في الأنشطة التَّعليمية. علاوة على ذلك، فإنَّ النَّهجَ المتكامل يؤثِّر إيجابيًا على تطورهم المعرفي، خاصةً في الاحتفاظ بالذاكرة، وحل المشكلات، واكتساب اللغة. حيث تساعدُ الأغاني والقوافي التكرارية في إثراء المفردات والوعي الصوتي، في حين تعمل الألغازُ التَّفاعلية على تحسين مهارات حل المشكلات لديهم. تسهمُ هذه الدِّراسةُ في فهم فوائد دمج العناصر الموسيقية وتقنيات الصُّور في التعليم المبكِّر للأطفال، وتؤكِّد على أهميةِ خلق بيئة تعليمية مُتعدِّدة الحواس وغامرة، تراعي أساليب التعلُّم المتنوعة، وتحتفي بالتَّنوع الثَّقافي لتحسين التَّطور المبكِّر للطفولة بفعالية.

الكلمات المفتاحية: العناصر الموسيقية، تقنيات الصور، المشاركة في التعلم، التطور المعرفي، التعبير العاطفي، التفاعلات الاجتماعية

Investigating the Effects of Integrating Musical and Image Technology on Pre-School Children's Learning Engagement and Cognitive Development

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Abstract: The aim of this study was to explore the specific cognitive benefits, emotional expression, and social development experienced by children when exposed to the integrated approach. To achieve this, a phenomenological approach was employed, utilizing thematic analysis of semi-structured interviews with preschool teachers. The participants were selected through purposive sampling to ensure a diverse and representative sample, with a minimum of 60 interviews conducted to reach data saturation. Through these interviews, the teachers shared their experiences and observations in the classroom, providing valuable insights into the impact of the integration of musical elements and image technology on early childhood education. The findings reveal that the integration of music and image technology significantly enhances learning engagement and active participation among preschool children. The combination of interactive visuals and music captures their attention, motivating them to actively participate in educational activities. Moreover, the integrated approach positively impacts their cognitive development, particularly in memory retention, problem-solving abilities, and language acquisition. Repetitive songs and rhymes aid in vocabulary and phonological awareness, while interactive puzzles improve their problem-solving skills. This study contributes to the understanding of the benefits of integrating musical elements and image technology in early childhood education. It emphasizes the importance of creating a multisensory and immersive learning environment, catering to diverse learning styles, and celebrating cultural diversity to enhance early childhood development effectively.

Keywords: Musical elements, image technology, learning engagement, cognitive development, emotional expression, social interactions

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Introduction

Technology integration has become a viable way to improve learning opportunities for young children in the quickly changing educational environment. As a possible catalyst for enhancing preschool children's learning engagement and cognitive development, the combination of musical components with image technology has drawn a lot of attention in this context (Bautista, Yeung, Mclaren & Ilari, 2022). It is essential to investigate cutting-edge strategies that may successfully encourage children's cognitive growth and drive to study since the preschool years represent a key phase of fast brain development and learning ability (Green & Dawson, 2018).

The traditional approaches to teaching young children often depend on static visual aids and straightforward aural cues to convey instructional material. But according to recent study, these conventional methods may not fully take advantage of how dynamic and multisensory young children's learning capacities are (Palaiologou, 2016). A captivating and immersive platform for fostering children's interest, focus, and active engagement is provided by the combination of music, with its rhythmic patterns and melodic structures, and image technology, which offers interactive visual stimuli (Lorusso et al., 2020).

It has long been known that music has a special potential to favorably affect cognitive functioning. Young children's memory retention, language development, and spatial thinking abilities may all be improved by exposure to music, according to studies (Gerry, Unrau & Trainor, 2012; Schellenberg, 2009). Moreover, music encourages social connection and emotional expression, which helps development of essential socio-emotional skills. Additionally, music encourages social connection and emotional expression, which helps people develop important socio-emotional abilities (Pek, & MacFarlane, 2017). This integration, when paired with image technology, has the potential to provide a multi-dimensional learning environment that engages all of the senses and helps children better understand difficult ideas (Forgeard, Winner, Norton & Schlaug, 2008). According to research by Fajri, Toba, Muali, Ulfah, and Zahro (2022), the use of image technology, such as interactive multimedia and visual aids, may improve comprehension, pique children's interest, and boost their drive to study. These visual cues provide a lively and entertaining medium for distributing instructional material, grabbing children attention, and promoting active exploration.

There is still a need for thorough empirical investigations to determine the precise impact of this approach on preschool children's learning engagement and cognitive development, despite the potential advantages of incorporating musical and image technology into early childhood education (Ganesh, Kumar, Reddy, Kavitha & Murthy, 2022). By exploring the impact of incorporating musical components and image technologies on the learning experiences of preschool children, the present study seeks to fill this knowledge vacuum. In this research, we want to investigate the impact of this novel method on many developmental domains of preschool children, such as attention span, memory retention, problem-solving skills, emotional expression, and social interaction. We want to identify this integrated approach's potential as a successful educational strategy for the early years by contrasting its results with those of conventional teaching techniques.

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Background

The basis for future learning and wellbeing is set throughout a child's formative years, which are characterized by exceptional growth and development. Children's brains experience fast synaptic connections throughout this key period, which shapes their cognitive capacities, language development, and socioemotional skills (Zayas & Nelson, 2018). In order to promote a love of learning and nurture a child's intrinsic curiosity, early childhood education is vital for maximizing this development (Rasalingam, Muniandy & Rass, 2014).

According to Hampel (2019), traditional early childhood education techniques have traditionally depended on teacher-led teaching, static learning materials, and restricted technology. However, there is an increasing understanding of the potential advantages of incorporating technology into early learning contexts in an era marked by extraordinary technical growth (Fajri, Toba, Muali, Ulfah & Zahro, 2022). The goal of this integration is to provide interactive experiences that appeal to children's' innate need to explore and play. In especially during the early years, music, as a strong and ubiquitous form of human expression, has a significant influence on brain development (White& Lee, 2019). According to research, early musical exposure may alter brain plasticity by strengthening neural connections and promoting a variety of cognitive processes (Schlaug, 2015).

The simultaneous activation of many brain regions by music improves memory and attention while encouraging emotional control and social engagement (Rasalingam, Muniandy & Rass, 2014). Additionally, phonological awareness and vocabulary acquisition have been related to increased language development via rhythmic and melodic musical experiences.

Similar to this, imaging technology has emerged as a vital resource for enhancing educational opportunities. Interactive multimedia, animations, and visual aids may be used to deliver information in a dynamic and engrossing way while also accommodating various learning preferences and engaging children on a variety of sensory levels (Bautista, Yeung, Mclaren & Ilari, 2022). Visual stimuli facilitate learning of abstract ideas, spark imagination, and promote engagement, eventually leading to a greater knowledge of the subject matter (Palaiologou, 2016). A potential synergy exists between musical components and image technologies that might improve preschool instruction. Teachers may design immersive, multisensory learning environments that captivate children's attention, maintain their interest, and encourage active discovery by fusing music and images. By using the inherent affinity young infants have for music, movement, and visual stimulation, this innovative method is set to revolutionize early childhood education (Lorusso et al., 2020).

Early studies have indicated good outcomes, despite the fact that research on the integration of musical and image technology in preschool education is still in its infancy. According to preliminary research, this method may greatly improve young children's learning engagement, knowledge retention, and problem-solving abilities (Williams, 2018; Rafiq, Kamran & Afzal, 2023). Additionally, the use of music and visual media has been linked to greater learning motivation and zeal, which has a good effect on cognitive development in general (Rasalingam, Muniandy & Rass, 2014). Given the potential advantages of this unique technique, thorough empirical research must be done to fully comprehend its impacts on preschool children's learning engagement and cognitive growth. Through this study, educators and policymakers may learn essential information about the effectiveness of combining musical and

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image technologies, enabling them to decide with confidence whether to embrace cutting-edge instructional strategies.

Background in Saudi Arabian Context

Early childhood education is very essential in Saudi Arabia because it lays the foundations for a cultured and informed society. In order to shape future generations and advance the development of the country, the Kingdom puts a high priority on ensuring that its young people get high-quality education (Khomais & Gahwaji, 2019).

Early childhood education has traditionally been conducted in structured classroom settings with teacher-led teaching. To improve teaching strategies and learning results, the nation has aggressively embraced technology in education (Aljabreen & Lash, 2016). The Saudi Vision 2030 places a strong emphasis on the value of developing education via innovation and technological integration (Alghamdi, Alsaadi, Alwadey & Najdi, 2022). The ambitious plan seeks to diversify the economy and society of the nation. Saudi Arabian culture has long included music and creative expression, and the country appreciates the arts to preserve its history and promote creativity (Bakhotmah, 2020). Saudi Arabia aligns with its traditional values while embracing modern educational breakthroughs by investigating the use of musical and image technologies in early childhood education.

Saudi Arabia's internet infrastructure and accessibility to technology have significantly improved in recent years. It has become a strategic objective to invest in cutting-edge educational methodologies that make use of technology as the nation transitions to a knowledge-based economy. In line with this aim, including musical components and image technology in early childhood education offers a special chance to engage young students and improve their cognitive and socioemotional development (Alenezi & Akour, 2023).

This study, which examines how using music and images in preschool education in Saudi Arabia affects learning outcomes, is especially contemporary and pertinent. Understanding the effects of this novel approach on learning engagement and cognitive development can help policymakers, educators, and parents make informed decisions about the future course of early education practices as the Kingdom continues to invest in early childhood development and education.

The need of establishing an inclusive and culturally sensitive educational environment is further increased by the cultural variety of Saudi Arabia and the sizeable expatriate community there (Al-Abdullatif, 2022). Children in the Kingdom come from a variety of backgrounds, so it is possible to respond to their needs by incorporating different musical traditions and imaging technologies. This will promote intercultural understanding and a feeling of community among the young students. The results of this research may support continuing efforts in Saudi Arabia to improve early childhood education and are consistent with the country's larger objective of reforming education via technology and innovation. The study may be a useful tool for Saudi educators and policymakers looking to improve early learning opportunities for children all around the kingdom by offering evidence-based insights into the efficacy of this integrated strategy.

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Problem Statement

In Saudi Arabia's evolving early childhood education landscape, traditional teaching methods may not fully harness the dynamic learning potential of young children. To address this gap and align with the goals of Saudi Vision 2030, which emphasizes innovation and technology integration in education, there is a pressing need to explore the impact of integrating music and visual technology on preschoolers' cognitive development and learning engagement. While music has historical significance in Saudi culture, its role in modern early childhood education remains under-researched, leaving questions about its compatibility with cultural ideals and educational objectives unanswered (Alwadai, 2014).

Research Objectives

1. To assess the impact of integrating musical elements and image technology on preschool children's learning engagement.

2. To investigate the effects of integrating musical elements and image technology on preschool children's cognitive development.

3. To examine the impact of integrating musical elements and image technology on preschool children's emotional and social development.

Research Questions

3. How does the integration of musical elements and image technology influence preschool children's level of learning engagement and active participation in educational activities?

4. What are the specific cognitive benefits experienced by preschool children when exposed to the integration of musical elements and image technology?

5. In what ways does the integration of musical elements and image technology influence preschool children's emotional expression and social development?

Theoretical Framework

To give a thorough knowledge of the effects of merging musical components and image technology on preschool children's learning engagement and cognitive development, the theoretical framework for this research focuses on two important educational theories. The following are the two theories that guide this study:

Constructivism

According to Jean Piaget and Lev Vygotsky's constructivist theory, learning is an active process in which people create knowledge and understanding from their experiences and interactions with the outside world. In the study's setting, the incorporation of musical components and image technology gives children the chance to actively interact with instructional material, supporting the development of new cognitive structures and mental representations. Children can link ideas thanks to the interactive and multisensory qualities of music and visuals, which also encourages them to explore and try new things, eventually enhancing cognitive development (Fosnot, 2013; Amineh & Asl, 2015; Mohammed & Kinyó, 2020).

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Multiple Intelligences Theory

The idea of multiple intelligences, put out by Howard Gardner, contends that people are endowed with several types of intelligence, and that, in order to promote healthy growth, learning environments should take these intelligences into account (Armstrong, 2017; Gardner, 2017). A variety of intelligences, including musical-rhythmic, visual-spatial, and interpersonal intellect, among others, are tapped into when musical components and image technology are combined. This technique offers a complex and multidimensional learning experience that addresses several intelligences at once, encouraging greater comprehension and engagement in a variety of learners.

To explain how the inclusion of musical components and image technology promotes active learning and cognitive development in preschool children, the theoretical framework of this research combines constructivism. The many intelligences hypothesis also sheds light on the various ways in which this strategy may be tailored to suit unique learning styles and aptitudes. The research attempts to clarify the underlying processes through which the integrated approach promotes preschool children's learning engagement and cognitive development by merging these two educational philosophies. A thorough investigation of the efficiency of incorporating musical components and image technology in early childhood education is made possible by the theoretical framework, which directs the design of the study methodology, data collecting, and analysis.

Methodology and Procedure

The interpretivism paradigm, employed in this study, is a research approach that delves into the subjective nature of human experiences, emphasizing the importance of context and individual perspectives. It seeks to comprehend the intricate web of thoughts, emotions, and meanings individuals attach to their experiences (Potrac, Jones & Nelson, 2014; Nickerson, 2022). This paradigm is particularly apt for the research inquiry into the effects of integrating musical components and image technology in early childhood education, as it enables a qualitative exploration of these complex phenomena.

By adopting qualitative research methodologies, such as interviews, this study aims to uncover the rich and nuanced perspectives of early childhood teachers in Saudi Arabia. It seeks to understand how these teachers perceive and interact with the integrated approach of technology and music in their classrooms. Through an interpretive lens, this research acknowledges the influence of teachers' unique cultural, social, and educational backgrounds on their practices and viewpoints. It recognizes that the integration of technology and music is not a one-size-fits-all approach, but a dynamic process shaped by diverse experiences and contexts.

The chosen research design for this investigation was phenomenological methodology. Phenomenology is a qualitative research approach that seeks to delve deeply into the meanings and interpretations that participants ascribe to the phenomena under study (Creswell, 2015). It aims to uncover the essence of human experiences and perceptions related to a particular phenomenon.

In this study, phenomenology is employed to explore how early childhood education teachers in Saudi Arabia perceive and interpret the use of musical components and image technology in their classrooms. This methodology is particularly suited for this research because it allows for a comprehensive examination of the lived experiences and perspectives of these educators. Phenomenology goes

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beyond surface-level observations and seeks to uncover the underlying structures of meaning that shape individuals' interactions with the integrated approach of technology and music in education (Connelly, 2010).

It offers a window into the unique insights, challenges, and innovative strategies these teachers employ within the context of their classrooms. Phenomenology allows researchers to capture the essence of these experiences and contributes to a deeper comprehension of the complexities surrounding technology and music integration in early childhood education (Bhattacharya, 2017).

Semi-structured interviews served as the study's main research approach. The flexibility of semi-structured interviews allows participants to freely express their perspectives and explore pertinent topics while preserving consistency between interviews (Xerri, 2018). The influence of the integrated approach on learning engagement and cognitive development may be better understood by conducting interviews with early childhood education teachers, who can provide specific and nuanced viewpoints.

The study's target population consisted of early childhood teachers in Saudi Arabia, and to ensure a diverse and representative sample, purposive sampling was employed (Marshall & Rossman, 2016). This method of sampling is chosen intentionally to select participants who can provide valuable insights into the research topic. In this case, the goal was to capture a range of perspectives from educators with varying geographic locations and levels of expertise within the field of early childhood education. Early childhood teachers from different regions of Saudi Arabia were invited to participate in the study, reflecting the country's cultural and geographical diversity. Additionally, teachers with varying levels of experience were included, recognizing that this diversity would likely yield a broader spectrum of perspectives and experiences related to the integration of musical components and image technology in the classroom (Rai & Thapa, 2015).

To ensure the depth and richness of the data collected, a minimum of 60 interviews were conducted. This number was determined by the point of data saturation, which occurs when no new information or insights emerge from additional interviews. Data saturation is a crucial criterion in qualitative research, indicating that the research has comprehensively explored the topic and captured a comprehensive range of participant perspectives (Marshall & Rossman, 2016). It ensures that the study's findings are robust and reflective of the full spectrum of views and experiences among early childhood educators in Saudi Arabia regarding the integrated approach of technology and music in education.

Semi-structured interviews that were performed in person or through online platforms were used to gather the data. With the participants' permission, the interviews were audio recorded and verbatim transcribed for analysis. To guarantee uniformity throughout interviews and provide freedom to explore new issues, an interview guide was created.

The data from the interviews were examined using thematic analysis. In this procedure, the transcribed interviews' patterns, themes, and codes are identified and categorized (Guest & MacQueen, 2017). In order to guarantee the accuracy and reliability of the results, the analysis was conducted in a methodical and iterative manner. The inter-coder reliability method, which gives participants a chance to examine and confirm the results, was used to validate the themes.

A lot of thought was given to ethical issues throughout the study process. All participants gave their informed permission, confirming that they were aware of the study's objectives, the voluntariness of their participation, and the confidentiality and anonymity of their answers. Data was safely retained, and participant names and personal information were kept private (Arifin, 2018). The study adhered to the ethical standards established by the appropriate organizations and ethical review boards for research involving human subjects (Patton, 2015).

Thematic Analysis and Findings

Research Question 1

- *How does the integration of musical elements and image technology influence preschool children's level of learning engagement and active participation in educational activities?*

The following themes are emerged by the thematic analysis of the interviews with preschool teachers on the integration of musical elements and image technology and its impact on early children's learning engagement and active involvement in educational activities.

- **Enhanced Learning Engagement**

Preschoolers' learning engagement is favorably impacted by the use of music and image technologies. Children's attention is drawn to the use of engaging images, vibrant animations, and instructional tunes, which inspires them to actively engage in the learning process. A vivid and dynamic learning environment is produced by the music and images combination, arousing interest, and a desire to learn more about the subject matter. One participant revealed that

> *"In my classroom, I have noticed a significant positive change in the level of learning engagement and active participation among the preschool children since we started incorporating music and image technology into our lessons. The children are more excited and motivated to participate in educational activities when there are musical elements and interactive visuals involved (P7)"*

- **Cognitive Development**

The combination of music and visual media helps children's cognitive development. Songs and rhymes that are repeated often assist children build their vocabulary and phonological awareness. Interactive visualizations make it easier to understand abstract ideas, such as mathematical principles, which enhances critical thinking and problem-solving abilities. Technology's interactive features encourage youngsters to think critically and integrate disparate concepts, which helps to develop their cognitive abilities.

- **Emotional Expression**

Technology in the form of music and images are effective mediums for expressing emotions. The usage of soothing music during relaxation time aids in the children's increased attention and relaxation. Playtime is more energetic and promotes healthy social relationships when there is lively music playing. The use of image technology in group projects encourages inclusion because children are more appreciative of one

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another's contributions, which encourages emotional expression and participation in group activities. One teacher revealed that

> *"Music has a profound impact on their emotional expression. For example, we use calming music during relaxation time, and the children visibly respond to it by becoming more relaxed and focused. On the other hand, lively music during playtime energizes them and encourages positive social interactions. Additionally, using image technology to showcase their artwork and projects fosters a sense of pride and accomplishment. It motivates them to share their achievements with their peers, leading to positive social exchanges and a sense of community in the classroom* (P13)"

- **Positive Social Interactions**

Positive social relationships among preschoolers are influenced by the blending of music and image technologies. Group projects and problem-solving exercises are examples of collaborative image technology activities that promote collaboration and teamwork while boosting social skills. Activities including music and dance encourage social interaction and group engagement, which strengthens the feeling of community in the classroom. One participant stated that

> *"The integration of music and image technology has been particularly effective during group activities and collaborative tasks. For instance, during interactive storytelling using image technology, the children actively engage with the content and discuss the story together. This shared experience promotes positive social interactions as they take turns, share their thoughts, and listen to their peers. Additionally, during music and movement activities, they participate as a group, fostering a sense of unity and teamwork (P23)"*

Cultural Diversity

The success of this strategy is enhanced by the incorporation of numerous musical traditions that represent the richness of Saudi Arabian culture. The children's cultural awareness and emotional involvement are enriched by the inclusion of classic Saudi Arabian melodies and folktales. The children benefit from celebrating cultural variety by developing a feeling of pride in their ancestry, fostering a good sense of self, and fostering respect for one another.

The first study question's theme analysis emphasizes the need to use musical components and image technologies in early childhood education. Preschoolers in Saudi Arabia benefit from a vibrant and welcoming learning environment that combines music and images to promote learning engagement, cognitive development, emotional expression, and constructive social connections. This comprehensive strategy may be essential for developing a passion for learning and laying the groundwork for children's successful academic endeavors. As one teacher described that

> *"Integrating various musical traditions is crucial in celebrating our cultural diversity. When we incorporate traditional Saudi Arabian music, the children connect*

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with their heritage on a deeper level. It instills a sense of cultural identity and pride, promoting inclusivity and mutual respect. Furthermore, it fosters a learning environment where children from different cultural backgrounds appreciate and learn from one another. By recognizing and incorporating our diverse musical traditions, we create an enriching and inclusive educational experience for all our students P29"

Figure 1

Themes Emerged from First Research Question
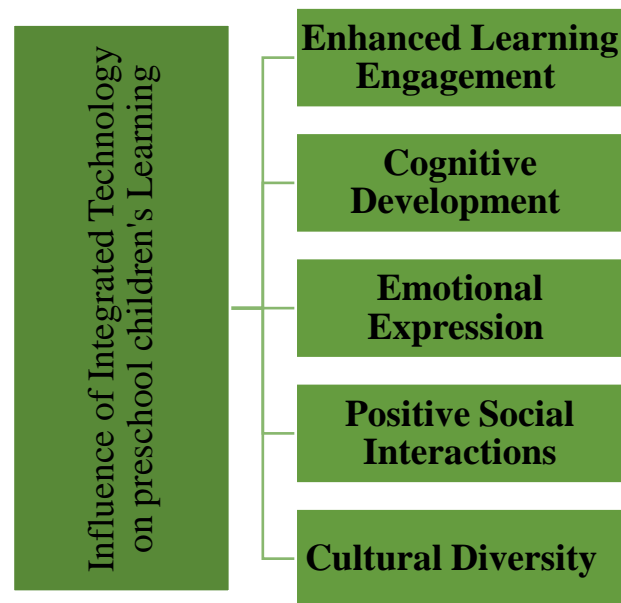
Research Question 2

- *What are the specific cognitive benefits experienced by preschool children when exposed to the integration of musical elements and image technology?*

The following themes are emanated by the thematic analysis of the interviews with preschool teachers on the incorporation of musical elements and image technology and its special cognitive advantages for preschool children:

- **Memory Retention**

Preschoolers' ability to retain information is favorably impacted by the use of musical components and image technologies. They learn material like the alphabet, numbers, and complicated ideas more rapidly when instructional songs with appealing melodies and repeating lyrics are used. Their memory is strengthened and made easier to remember throughout later learning sessions thanks to the music and images combo. One participant revealed that

"I've observed several cognitive benefits among the children since we started integrating music and image technology into our lessons. One notable improvement is in their memory retention. For example, when we use educational songs with repetitive lyrics and catchy tunes,

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the children quickly memorize information such as the alphabet, numbers, and even complex concepts like parts of the human body. The combination of music and visuals helps reinforce their memory and aids in recall during subsequent learning activities (P36)"

- **Problem-Solving Abilities**

The use of musical components and image technologies enhances preschoolers' capacity for problem-solving. The use of image technology in interactive games and puzzles encourages youngsters to think critically, evaluate data, and come up with answers. Participating in these activities enhances their logical reasoning, strategic planning, and fortitude under pressure. As one teacher highlighted

"When we use educational games and interactive puzzles with image technology, the children become more adept at problem-solving. These activities challenge them to think critically, analyze information, and find solutions. For instance, we use interactive math games that require them to count objects and match numbers, which helps strengthen their numerical reasoning skills. The integration of music and visuals makes the learning process enjoyable, motivating them to persist in solving problems and improving their problem-solving abilities over time p40"

- **Language Acquisition**

Integration of musical components with image technology has a big impact on language learning. They improve their pronunciation and phonological awareness via educational songs and rhymes. Their comprehension of new ideas and vocabulary is aided by the use of image technology to present images associated with vocabulary terms. The multimodal learning process makes learning a language more interesting and efficient.

- **Positive Instances of Cognitive Benefits**

The cognitive advantages of this integrated approach are shown by specific examples. For instance, the introduction of new educational software including interactive quizzes and animated tales boosted language proficiency and understanding. Activities including music and dance that include math's and counting have improved students' comprehension of numbers. Learning becomes more fun and approachable when music and images are integrated, promoting good emotional learning experiences. One teacher stated that

"One instance that stands out is when we introduced a new educational app with animated stories and interactive quizzes. The children were not only excited to engage with the stories but also enthusiastically participated in the quizzes to test their comprehension. Over time, we noticed their language skills improving as they were able to comprehend more complex narratives and respond to questions accurately. The integration of music and visuals in these activities heightened their

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interest and focus, leading to noticeable cognitive growth in language development and memory retention P 46"
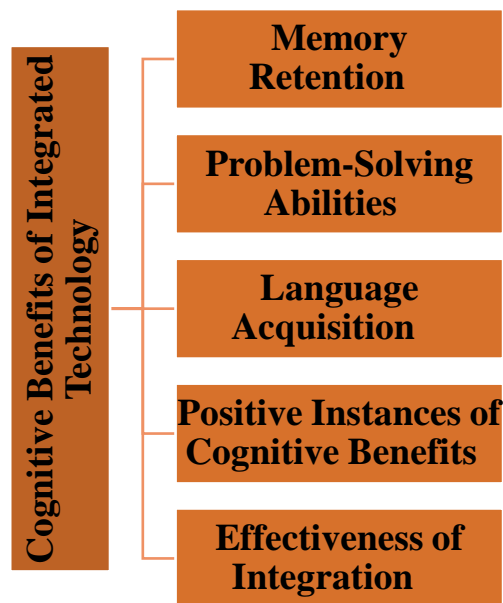
- **Effectiveness of Integration**

The creation of an immersive, multimodal learning environment is key to integration's success. Children's attention is captured, their imaginations are sparked, and learning is made fun and interesting through music and images. The interactive features of educational technology encourage involvement and discovery while accommodating various learning preferences and styles. The uplifting feelings evoked by music and visuals increase motivation and passion for studying, which helps to develop cognitive abilities.

The use of musical components and image technologies in early childhood education provides preschoolers with distinct cognitive advantages. By fostering an engaging and multisensory learning environment, this method improves language acquisition, problem-solving skills, and memory retention. As one participant described that

"I believe the effectiveness of this integrated approach lies in its ability to create a multi-sensory and immersive learning experience. Music and visuals capture the children's attention and stimulate their imagination, making learning enjoyable and engaging. The interactive nature of educational technology allows them to actively participate and explore, fostering a deeper understanding of concepts. Moreover, the positive emotional experiences associated with music and images enhance their motivation and enthusiasm for learning, contributing to improved cognitive skills P49"

Figure 2

Themes Emerged from Second Research Question

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Research Question 3

- *In what ways does the integration of musical elements and image technology influence preschool children's emotional expression and social development?*

The following themes are bare by the thematic analysis of the interviews with preschool teachers on the integration of musical elements and image technology and its impact on young children's emotional expression and social development:

- ### Expression of Emotion

Preschoolers' emotional expressiveness is greatly influenced by the blending of musical components and image technologies. The use of soothing tunes during relaxation time helps youngsters become more peaceful, attentive, and willing to share their ideas and feelings since music has a way of triggering emotions. Lively music during playing gives children energy and promotes the expression of pleasant emotions. Additionally, children may express themselves via movement during music and movement activities, which helps them process their feelings and emotions. One teacher revealed that

> *"The integration of music and image technology has had a significant impact on the emotional expression and social development of the children in my classroom. One notable influence is on their emotional expression. When we use calming music during relaxation time, I've noticed the children becoming more relaxed and focused. Additionally, during music and movement activities, the children enthusiastically express their emotions through dance and movement. Music seems to provide a channel for them to express their feelings in a positive and expressive manner (P53)"*

Emotional Control

The capacity of preschool children to control their emotions is also influenced by the use of musical components and image technologies. During relaxation time, calming music and interesting images create a relaxing environment that aids youngsters in managing their emotions and lowering their stress levels. Their emotional well-being is improved, and a more pleasant emotional state is a result of the good emotional experiences connected to music and visuals. Children who use music and images as tools for self-expression and self-regulation are better able to handle a range of emotional circumstances.

- ### Positive Interactions with Others

The social development of preschoolers is favorably impacted by the use of musical components and image technology, fostering healthy social relationships. Activities including music and movement encourage social contact and group engagement, which encourages children to connect with their peers in a good way. Children learn to share ideas, collaborate, and work together via collaborative projects that use image technology, such as group art projects. Their ability to communicate clearly thanks to technology's interactive features also improves their communication abilities. As one participant described that

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> *"Music has a powerful effect on their emotional expression. When we use calming melodies during circle time, the children become more relaxed, attentive, and open to sharing their thoughts and feelings. Moreover, the use of image technology for collaborative activities, such as group projects and problem-solving tasks, encourages teamwork and cooperation among the children. It also helps build their social skills, as they learn to respect each other's ideas and opinions. The children become more confident in expressing themselves and engaging in positive interactions with their peers (P57)"*

- **Cooperation and Diversity**

The inclusion of many musical traditions, which represent the cultural variety of Saudi Arabia, fosters a spirit of inclusion and collaboration in young preschoolers. Children connect with their cultural background and have a better knowledge of who they are when traditional Saudi Arabian music and folktales are included. This encourages a learning environment where children accept and learn from one another's cultural backgrounds, encouraging collaboration and mutual respect. As one participant stated that

> *"One memorable instance was during a music and movement activity. We used lively music to accompany a dance routine that required cooperation and coordination among the children. As they danced together and followed the steps, I observed their cooperation and teamwork improving. They cheered each other on and celebrated their collective achievements, fostering a supportive and inclusive social environment (P60)"*
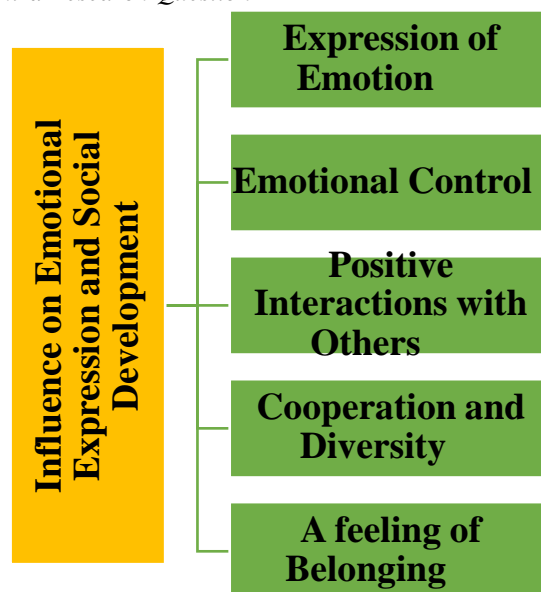
A feeling of Belonging

A feeling of community is fostered in the classroom through the use of musical components and imaging technology in preschool instruction. Children develop a sense of shared experience when they participate in group activities like playing interactive games and singing along to instructional music. Children benefit from a friendly and inclusive learning environment where they experience a feeling of unity and belonging because of the collaborative nature of these activities.

The social and emotional development of preschoolers is influenced favorably by the use of musical components and image technologies. A happy emotional state is influenced by the way that music and imagery trigger feelings and help with emotion control. Positive social relations and collaboration are encouraged by employing technology to participate in music and dance activities as well as collaborative jobs. Furthermore, promoting inclusion and a feeling of community among preschoolers in Saudi Arabia via the incorporation of many musical traditions while honoring cultural uniqueness.

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Figure 3

Themes Emerged from Third Research Question

Discussion

The results of this research show how musical components and image technologies may significantly improve preschoolers' learning engagement, cognitive development, emotional expression, and social relationships. The thematic analysis uncovered a number of significant themes that shed light on the distinct advantages enjoyed by children in early childhood education settings. These themes are consistent with other studies in the sector and add to our knowledge of how this integrated strategy might be used to improve early childhood education.

The increased learning engagement among preschoolers when exposed to musical components and image technology is one of the key findings that emerged from the investigation. This result is in line with other research (Tzima, Styliaras, Bassounas & Tzima, 2020) that showed the motivating potential of music and interactive images in educational contexts. Children are drawn in and encouraged to participate actively when music and visuals are combined to create a dynamic and interesting learning environment. Children's enthusiasm for learning has been proven to increase when they are exposed to educational songs and interactive narrative applications, for instance (Jenkins, 2018). This greater involvement encourages a better knowledge of the subject matter and a positive outlook on learning.

Additionally, the combination of musical components and image technology contributed to advancements in preschool children's cognitive development, according to the theme analysis. This result is consistent with other studies (Ko & Chou, 2014) that emphasized the cognitive advantages of music and images in early childhood schooling. Songs and rhymes that are repeated help youngsters retain knowledge better, which helps them internalize language and mathematical ideas (Al-Deraweesh, Al-Rawashdeh, and Al-Khalayleh, 2018). Additionally, interactive puzzles and games foster critical thinking, spatial reasoning, and problem-solving skills. These exercises provide a multimodal learning experience that fosters cognitive development and skill acquisition thanks to the incorporation of music and images (Loderer, Pekrun & Plass, 2020).

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The impact of musical components and image technologies on preschool children's emotional expression and social development is another important subject that arose from the investigation. This result is in line with other studies showing that music has a significant influence on social interactions and emotional regulation (Blasco-Magraner et al., 2021). Children who are listening to soothing music during relaxation time are better able to control their emotions, which improves the emotional environment in the classroom. On the other hand, energetic music and movement activities energies children's and promote fruitful social connections. The use of image technology in group projects encourages youngsters to work together, cooperate, and feel included (Jenkins, 2018). The supportive and caring climate in the classroom is influenced by these good emotional experiences and social interactions.

A vital component of the research was the merging of many musical traditions, which reflected the richness of Saudi Arabian culture. This conclusion is consistent with other research (Ko & Chou, 2014) that highlights the value of culturally inclusive education. Children's cultural awareness is enriched, and a feeling of heritage pride is fostered by including classic Saudi Arabian songs and folktales (Abdelazim Ahmed, 2017). Children from various cultural origins benefit from this cultural inclusion by developing good self-identities and fostering tolerance for one another. Additionally, it fosters a learning environment in which children may relate to the material on a personal level, therefore boosting their emotional involvement and overall learning experience.

Despite the many advantages shown in this research, it is important to be aware of any possible difficulties and restrictions associated with using musical components and image technology in early childhood education. The accessibility and availability of appropriate technical resources in all educational settings may provide a difficulty. Some preschools may not have the resources or equipment needed to properly adopt such an approach (Al-Otaibi & Al-Mulhim, 2023). Therefore, it is imperative that educators and decision-makers think about ways to increase access to and equity in the use of technology for all students. The need for sufficient teacher preparation and professional development is another factor. Teachers must be knowledgeable of the best methods for integrating music and image technology into the classroom in order to fully realize the possibilities of this integrated approach. To increase teachers' confidence and competence in using this strategy and guarantee its effective incorporation into the curriculum, on-going training and assistance are recommended (Ghavifekr & Rosdy, 2015).

The results of this research show conclusively that incorporating musical components and image technologies into early childhood instruction is successful. The effectiveness of this strategy in fostering cognitive growth, emotional expression, social connections, and learning engagement in preschoolers is highlighted by the favorable effects it has on these areas. Educators may cultivate students' brains and build a strong foundation for lifetime learning and wellbeing by carefully integrating music and images. Future study should examine creative approaches to include music and image technology into early childhood education and look into its long-term implications on children academic performance and socioemotional development as technology continues to advance.

Conclusion

The enormous advantages of using musical components and image technology in early childhood education have been made clear by this study. The results show that

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this strategy has a good impact on preschoolers' social interactions, emotional expressiveness, and cognitive growth. A love of learning and critical thinking is fostered through educational tunes and interactive images that improve memory retention and problem-solving skills. A supportive and emotionally caring environment is created with calming tunes and visual signals that help with emotional expression and management. Enhancing social growth and mutual respect, music and image technologies foster constructive interpersonal relationships, cooperation, and cultural inclusion.

This research has broad ramifications for early childhood education. These findings may help educators design inclusive, engaging learning environments that are sensitive to the different needs and cultural backgrounds of students. Teachers can help children feel secure and connected by encouraging emotional expression and management. This will enable them to acquire essential socioemotional abilities. The celebration of cultural variety that results from embracing many musical traditions enriches learning for all children and promotes understanding. Although this work makes important contributions to the area, it is important to understand its limits. The results may not be fully generalizable to other contexts since the study was done in a particular cultural situation. Future research might consider the viewpoints of children and long-term observations to better understand the long-term effects of this integrated strategy.

In general, combining musical components with imaging technology provides a promising and practical way to enhance early childhood education. Teachers may create dynamic and engaging learning settings that foster a generation of well-rounded, emotionally aware, and socially skilled people by using the power of music and graphics. Adopting this cutting-edge method may be vital in ensuring that preschoolers have a better future by allowing them to succeed in their academic endeavors and make valuable contributions to society.

Recommendations

Several suggestions may be made to improve the integration of musical components and image technology in early childhood education in light of the research's results and analysis:

1. Provide educators with thorough and continuous opportunities for professional development to help them become acquainted with the proper use of musical components and image technologies in the classroom. To meet the varied requirements of preschoolers, training sessions might concentrate on combining various musical traditions, choosing suitable instructional songs, and using interactive visual aids.

2. Create instructional materials that, especially in the context of Saudi Arabia, represent the cultural variety of the preschool population. Children from various cultural origins will appreciate one another more if traditional Saudi Arabian music, folktales, and images are used. This will also encourage cultural pride.

3. Create a seamless integration of musical components and image technologies across all topic areas. utilize interactive images in scientific and social studies lectures, for instance, or utilize instructional music to reinforce language and

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arithmetic topics. Children's cognitive abilities will improve thanks to this all-encompassing strategy, which will also make learning interesting and fun.

4. Conduct regular evaluations to gauge how the integrated approach is affecting children's social interactions, emotional expressiveness, and cognitive growth. Utilize a mix of qualitative and quantitative techniques to assess how memory retention, problem-solving skills, emotional control, and social skills have changed over time.

5. Encourage group projects, problem-solving exercises, and interactive games as part of cooperative learning opportunities. These classroom activities encourage students to work together, communicate, and cooperate with one another, fostering healthy social relationships and a feeling of community.

6. Make sure that all students in the classroom have access to imaging technology. Take into account elements like gadget accessibility and adaptation to suit children with various learning styles. By giving everyone equitable access to technical resources, we promote inclusive educational experiences.

7. Maintain a balanced approach to screen time and technology use while incorporating imaging technology. To encourage a well-rounded and developmentally appropriate learning environment, promote a combination of interactive activities, outdoor play, and hands-on experiences.

8. By informing parents about the integrated approach and giving them access to tools for extending learning at home, you may include parents in the educational process. Encourage parents to reinforce topics acquired in the classroom via instructional music, interactive games, and visual media.

9. Investigate the long-term impact of incorporating musical components and image technologies on children development beyond preschool by conducting longitudinal research. Look into how this strategy's cognitive, emotional, and social advantages affect students' academic performance and wellbeing in later stages of schooling.

10. In order to continuously enhance and strengthen the use of musical components and image technology in early childhood education, encourage cooperation between educators, researchers, and policymakers. Collaboration may result in evidence-based procedures that enhance preschoolers' learning opportunities.

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