DIGITAL MUSIC TOOLS AND THE FUTURE OF EARLY CHILDHOOD EDUCATION: IMPLICATIONS FOR MUSIC EDUCATORS AND CAREGIVERS IN NIGERIA

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Abstract
The introduction of digital music tools into the curriculum of early childhood education is making the traditional way of teaching and learning not only fresh and modern but also interesting and engaging. In the presence of low education and childhood development in Nigeria, both of which face challenges such as insufficient resources and facilities and a lack of modern learning technologies, the digital music tools become a way through which music educators and caregivers can gain knowledge and skills. The study deals with the theoretical underpinnings of the introduction of digital music tools in preschool education with a focus on the Constructivist Learning Theory (Piaget & Vygotsky), Social Learning Theory (Bandura), and Multiple Intelligences Theory (Gardner), and also it gives a detailed account of current developments, difficulties, and the impact of digital music tools on cognitive, emotional, and social growth in children. The research draws attention to the possibilities for music educators in the creation of digital music content and applications directed at Nigerian preschoolers. Furthermore, it makes suggestions for a revised policy with the view of actualizing digital music in early childhood education besides overcoming such obstacles as technological access, caregiver digital literacy, and cultural perceptions. This inquiry not only fills the void in the knowledge about music entrepreneurship and early childhood education, but it also goes further to provide evidence of how, through digital music tools, learning outcomes be improved and educators meet more business opportunities.

Keywords: Digital Music, Early Childhood Educators, Caregivers, Music Educators, Preschools.

Introduction

Music has long been recognized as a powerful tool for learning and cognitive development in early childhood education. Across cultures, music serves as a fundamental medium for communication, self-expression, and knowledge transmission. In the early years of a child's life, exposure to music enhances brain development, language acquisition, and social skills. According to Hallam (2015), engaging with music not only fosters creativity but also strengthens memory retention and improves phonological awareness—key elements in early literacy development. For Nigerian children, music has traditionally been embedded in everyday learning experiences, from rhythmic clapping games to folk songs that teach moral lessons. However, as societies evolve and technology advances, so too must educational strategies.

In Nigeria, early childhood education has long relied on traditional oral storytelling, lullabies, and

folk songs as tools for teaching values, reinforcing cultural identity, and aiding memory development. Grandmothers, caregivers, and preschool teachers use rhythmic chants and call-and-response songs to captivate young learners and instill foundational knowledge in an engaging way. These traditional methods remain effective, but the digital age is redefining how children interact with music. The emergence of digital music tools presents new opportunities for expanding early childhood education beyond oral traditions, blending old and new methods to enrich learning experiences. With the rapid evolution of educational technology, digital music tools ranging from interactive apps to AI-powered music tutors are transforming early learning experiences globally. These innovations leverage sound, rhythm, and interactivity to create dynamic and immersive learning environments. Mishra and Koehler (2020) emphasize that digital platforms allow for personalized learning experiences, enabling children to develop cognitive and motor skills at their own pace. This was further collaborated by Albert and Lawson (2023) highlighting the neurological basis for music education in preschool children. Whether through engaging educational songs on YouTube, interactive rhythm games, or AI-driven music composition tools, technology is reshaping how young learners engage with music.

Even with these improvements, Nigeria still has a number of hurdles to cross to be able to efficiently incorporate digital music tools into early childhood education. The restriction of technology, scarcity of teacher training, and socio-cultural stereotypes are the main factors preventing the use of most schools. Many kindergartens are without the necessary equipment, such as steady internet access or PCs, to be able to utilize tech-supported training methodologies (Omoera, 2021). Additionally, some instructors and parents are not yet convinced that replace traditional teaching with digital alternatives would not beyond doubt weaken the cultural heritage, and this creates skepticism still.

Nevertheless, the elimination of these hurdles creates a lot of good and appealing opportunities for the teachers working in early childhood that

indeed touches other sectors of the economy such as music businessmen. Through the use of digital mediums, the teachers are not only able to bring out the best in classroom engagement but they are also able to have a positive impact on the learning outcomes while on the other hand, music educators can create viable music learning apps that are in Ghanaian lingua franca so as to reach out to the young ones in the country it's always better to hit the iron while it's still hot to maintain the country's music potential. Music education, technology, and entrepreneurship all merging together brings about new transformations that are now not only in the schools but also the larger community that surrounds them can also benefit of which the music industry is one such big sphere (Lawson et al., 2024).

Some important issues that this study looks into are the use of digital music tools in the early childhood experiences in Nigerian preschoolers and whether these tools have been instrumental in developing their cognitive, emotional, and social skills (Lawson & Jaja, 2023). It also provides a summary of the necessary basic knowledge of music educators to facilitate the use of digital music, the ongoing changes, and the challenges in Nigeria and the potential music teachers have for using digital tools as a business platform. Being knowledgeable on the pros and cons of using digital music tools in early childhood education, various key players involved such as teachers, parents, policymakers, and music entrepreneurs are better equipped to advocate and champion digital literacy in their education sector thus making it more inclusive, technologically savvy, and culturally relevant.

The meeting point of music entrepreneurship and early childhood education opens an unusual door for Nigerian music educators and caregivers. As Plato said, masters of the first phase of education can equip traditional music with digital music tools to the extent of enhancing children's learning experiences, while music educators are able to earn incomes from digital platforms through creating music-based learning content. Being familiar with the functioning of these digital tools in the local Nigerian preschool settings is highly crucial for getting the most out of them.

Conceptual and Theoretical Framework

Digital Music Tools in Early Childhood Education

Seeing the room where kids, one after another, are eagerly coming around the table that plays a song and shows the letters of the alphabet in a nice way and listen to that song by a colorful app. Some of the kids are having the time of their lives and dancing, others are making their voices heard, and a few are virtually playing musical instruments. At this point, think about another situation-a person who is taking care of a child at his or her home and trying to comfort the child by playing a very soft lullaby on the smart speaker. These instances demonstrate the power of digital music tools being used effectively to teach small kids.

But what are the digital music tools in the first place? It's easy; these are applications, platforms, and online resources which are created to use music to help learn. They are quite different from conventional teaching which is based on lifeless aids that enable the kids to sit and gets them bored. The tools do not just expose children to multiple senses in their learning but also enable a lot of participation and interaction from them. With the help of suitable digital gadgets, learning is converted into a process that any child can easily understand and like—the way that each student has his or her own pace.

Exploring Digital Music Tools in Early Learning

Let's dig a little deeper and check out some of the best digital music tools that have revolutionized early childhood education:

a. Interactive Learning:

Apps (e.g., ABC Mouse, Lingokids): The apps are more driven by music, with ABC Mouse and Lingokids being in the line of education apps for kids. In fact, the two programs identify songs and use rhythmic games to introduce and practice the alphabet, the numbers, and the vocabulary. Kids do not just passively listen - most of all, they tap, sing, and engage with the music, which is the element that makes learning look and feel like playing instead of studying.

b. Music Streaming:

Platforms (e.g., YouTube Kids, Spotify Kids): Parents and teachers can now easily get hold of children's songs without searching through CD cases thanks to music streaming services like YouTube Kids and Spotify Kids. These two subscriptions provide a range of educational songs, nursery rhymes, and instrumentals only meant for little kids. From a phonics song that is great for naturalizing language to a calming melody that can guarantee naptime, these services simplify the whole process of integrating music into the household.

c. AI-Powered Music:

Tutors (e.g., Smart Music): Who has never dreamed about a music teacher in the form of an AI that listens to a child playing a music instrument and at the same time, gives the kid instant feedback? AI-powered tools just like Smart Music sound exactly like the prior mentioned example. The aforementioned interactive multimedia instruments are based on the concept of artificial intelligence, which is able to recognize a child's mistakes, and then propose correct ways and alternative choreographies to them. They, certainly have a personal assistant tutor feeling. Moreover, these tools are synchronous by default for the case of a musical instrument. However, AI tutoring is being utilized in kids' education in the former.

d. Online Music Learning Platforms (e.g., Simply Piano, Yousician):

Even the little ones who are crazy about music will find in apps like Simply Piano and Yousician a perfect way to lead their (music) education since these applications give the kind of interactive feedback that shows them how to play the piano or guitar in real time. These platforms also work on the principle 'the music should be fun, interactive, and gamified,' which is designed to persuade children to stick with learning rather than lose their eagerness after only a few lessons.

Why Are These Tools Game-Changers?

By contrast with the traditional learning systems that have been based on talking, digital music tools bring forward the practice of active engagement. When children combine the three senses, they can

visualize, listen and act and that is the most efficient way of learning. Among these, the findings of Hargreaves and Lamont (2017) come to the forefront as they display that digital music-based learning has a positive effect on cognitive, social, and emotional aspects of a human being.

Moreover, not only can these tools help learn, but they are also an inclusive learning environment. The kids who are more inclined to various learning channels, such as those auditory, visual, and kinesthetic, can makes sense of their strong points through the use of music in their preferred way. To give an example, a child with reading difficulty might learn the new words via singing if the song is very catchy and repeated.

Bridging the Gap From Digital Music to Everyday Learning:
Now, the real issue is- what are the ways that these tools can help in the Nigerian classrooms and families? The puzzle is the availability and the training. Before we continue, let me just say that these digital music tools have unlimited potential but they will only benefit if awareness and teachers, care providers, and parents understand how to use them. This includes running education programs for teachers, creating digital music content that is relevant to the local culture and languages of Nigeria) and making music learning apps available at a low cost to even schools with less financial resources.

If the existing services are moved to cloud and low-cost schools can access affordable music-learning apps, this may bring about increased access to music education. By this Nigeria can not only earn a world of new and unseen before opportunities but at the same time take a step closer to the music-driven digital education.

Digital technology combined with conventional learning styles:
Moving on to another aspect that has blended the two (i.e., technology with technology and traditional learning methods), one can that Nigeria is, in this regard, at the threshold of actually achieving such. With music as the tool, literacy can be promoted through reading and writing. For the

last couple of years, the access to information, new ideas and also with the Internet of Things laying a strong

Theoretical Perspectives
Implementing digital music tools in preschool education has a number of learning theories to rely on to give better understanding of children's learning styles. From constructivist approaches that emphasize the issues of experience in learning to social learning frameworks that highlight the role of observation and imitation, all these theories form a basis for explaining how digital music tools can be beneficial to learning.

In this review, three main theories: Constructivist Learning Theory, Social Learning Theory, and Multiple Intelligence Theory are provided and how they facilitate the use of digital music tools in early childhood education are the discussion points.

1. Constructivist Learning Theory (Piaget & Vygotsky):
The Theory of Constructivist Learning is a theory proposed by Jean Piaget (1952) and later on expanded by Lev Vygotsky (1978). It states that children are the active makers of their own knowledge through experiences rather than subjects who only receive information passively. Meanwhile, according to the theory, learning is a process in which children are in direct interaction with the environment; engage in activities related to uncoveries, and form new mental constructs through their contacts with the world.

Digital music tools are perfectly aligned with the in cognitive constructivist learning theory through offering a variety of rich, interactive and multi-sensory learning situations enabling self-exploration and creativity. In contrast to the traditional teaching methods that make kids memorize by repetition, digital music programs get kids to work with the senses, emotions, and by getting involved in playing, they promote the learning process. Children are allowed to experiment, search, and create in their own way.
For instance, Lingokidsis a gamified and interactive learning platform for kids that helps them to do various tasks (sing, tap the rhythm,

create the music, and much more). During this period of exploration, the kids not only understand the basic concepts of art like music and others researched by the researchers but also learn how to speak a new language by provincial or even unfamiliar parts of the country, thus supporting Piaget's concept of learning as a process that is not choreographed but is something the motivated self-directed student takes active part in.

The idea of a person's individual developmental area that can be further developed (ZPD), which has been suggested by Vygotsky, indicates the best way for kids to learn is when they are guided by a person who knows more than they do and who can encourage and motivate them. Digital music apps are ins bridge this gap through scaffold learning experiences in which kids are given hints or feedback.

2. Social Learning Theory (Bandura, 1986):

Albert Bandura's Social Learning Theory (1986) has focused on observation, imitation, and modeling as the major factors in learning. Bandura stated that children can observe others in the learning process, and they are then able to copy the behavior that has been seen by themselves at a later stage of development. This concept finds one of its most pertinent applications in the place of early childhood education. This is where the children, through the means of watching and copying caregivers, peers or digital media, are able to learn the most effectively.

Visual and auditory stimulation are heavily relied upon by digital platforms in order to facilitate the learning process through people copying others and repeating the same action several times. A large number of the music-based digital tools on the market which employ interactive videos, tutorials, and accompanied singing lessons are able to show, perform and repeat children in a fun way the musical patterns they wish to learn. YouTube Kids is an example of how kids in digital music education learn, as this platform not only delivers a variety of music-based educational video content but also gives children an opportunity to listen to music educators, who will give brief lectures, and they can follow them in the playback. This is in line

with Bandura's theory that children do learn the behaviour they see others around them doing (be it dance, rhythm, or a new song) besides learning to be good from adults.

Peer-initiated:

Learning is another form of social learning through technology. The apps like Kiboomu kids make use of animated characters whom children can both watch and sing along with and hence, this serves as a tool for the children to witness and participate in a particular situation. In this way, children are on the way to become not interested in "imitating what they see on a screen" but have also the possibility of directly "copying the actions develop trust in what they can do, advantageously the social learning principle that knowledge arises when done collectively are in a social context

3. Multiple Intelligence Theory (Gardner, 1983):

Howard Gardner's Multiple Intelligence Theory (1983)is a reactive and fresh way of looking at the issue of intelligence. It is in effect a statement that intelligence is not a fixed property of the individual. According to Gardner, the essence of human intelligence lies in eight distinct abilities of a person that can be developed, and one of the types is musical intelligence.

Digital music tools are not only interchangeable with a broad range of learning styles, but also together they enable all students to learn in one way. They may also be a great help when children affirm their cognitive abilities since the instruction of one manner can have the same effect on:

i. **Musical Skill:** Some kids are good at knowing sounds, beats, and tunes. Apps like Simply Piano boost this skill by helping kids pick out sounds and play music in a fun way.

ii. **Word Skill:** Kids who talk well learn from stories in songs and tunes that rhyme, which helps them hear and say sounds better. Sites like Sing Up have songs that make learning words and reading easier.

iii. **Body Skill:** Kids who learn by moving do well with dance apps like GoNoodle. These apps mix music with dance, helping kids learn by using their bodies.

We see that kids have their own ways of thinking. Digital music tools offer a fun learning way, made for each kid's needs. This helps every kid feel a link with what they learn in their own way. In Nigeria, to use digital music tools in young kids' learning, we need to know how these new ideas work with what's already there. In the past, telling stories, clapping games, and folk songs were key in teaching young kids. By using digital tools that add to these old ways, teachers can make a mix of new and old learning styles.

However, challenges such as limited access to technology, lack of teacher training, and cultural resistance to digital learning must be addressed. A solution-oriented approach would involve:

i. **Teacher Skills:** Helping teachers learn how to use new music tech in class.
ii. **Local Music:** Making music tools in Nigerian tongues to help all and tie to local culture.
iii. **Cheap Tech:** Making sure that school with less money can get and use low-cost tech, even with few resources.

Nigerian educators can exploit the potential of digital tools to make an interesting, interactive, and culturally suitable early childhood education system. By drawing parallels between digital music education and existing learning theories, the educators are the ones who are at the center of decision-making, adherence to the stipulated literacy laws, development of education concept, the quick centralization of childhood education, multimedia in education as well as adherence to privacy and information security acts.

The use of Constructivist Learning Theory, Social Learning Theory, and Multiple Intelligences Theory as educational theories provides the highest quality of class organization within early childhood education. These tools are used to enable interactive, observational, and personalized learning experiences, which in turn are the major value of the classrooms in modern days.

Emerging technologies have made it possible for educators in Nigeria to take music as a cultural artifact and to also transform it into a viable and easy to communicate didactic tool. The introduction of digital music tools, apart from that, makes it easy for the educators to give information.

Digital Music Tools and Early Childhood Education in Nigeria Current Trends and Adoption Rates:

The use of tech tools for music in early kids' learning is on the rise, mostly in Nigeria where more people can get mobile tech. But, the speed of this change depends on things like the setup in place, how well teachers are trained, and what people think about it culturally..

a. More use of phones and tablets in city schools: A lot of city preschools are using tech apps for learning. Tablets and phones help kids play learning songs, games, and do fun rhythm tasks. These tools let little kids use music apps in a planned, set way.

b. More people like learning YouTube channels in Nigeria: Sites like YouTube Kids are getting big among parents and teachers in Nigeria. Channels with school songs, tales, and music for sounds are very busy. This change shows how online stuff can add to old ways of teaching.

c. Local digital music tools are slowly being used more and more. Even though apps from other places rule the market, there's more interest in tools made here, for Nigerian languages and ways of life. Many new companies are making apps that use old African folk songs, local ways of speaking, and home-grown music tools in teaching young kids. But, things like money, building the needed stuff, and getting the word out still make it hard for these tools to be used by many.

Benefits of Digital Music Tools:

The integration of digital music tools into early childhood education offers numerous benefits, particularly in the areas of cognitive development, emotional engagement, and social learning.

i. Cognitive Growth: Boosts memory, sound and word skills (Hallam, 2015):

Music has been proven to help keep memories better, make sounds and words easier to understand, and help kids start talking sooner. Websites and apps that use music to teach (like in alphabet songs) aid kids in learning to read and

write faster than just repeating things over and over without music.

ii.   Emotional Involvement: Lowers worry, grows self-showing (Gibson, 2020):

Music is key in helping kids handle their feelings. Tools for music on the web let kids show themselves by singing, moving, and playing with rhythm. Studies show that doing set music activities can make worry less, and give a feeling of peace and happiness to young ones.

iii.   Social Learning: Boosts team work by group tasks:

Lots of online music sites help with team learning, letting kids sing, dance, or play songs with each other, either online or in a real room. This grows team skills, working well with others, and talking and playing together. This fits with Bandura's idea of Social Learning, which says we learn by seeing and copying others.

Challenges and Barriers:

Despite the many benefits of digital music tools, their implementation in Nigerian preschools faces significant barriers, including technological limitations, educator readiness, and cultural attitudes toward digital learning.

1.   Not much Tech: Some early school spots can't get online (Omoera, 2021).

In the far out places and spots that don't get much help, things like bad web links, no power, and costly tech stuff stop the big use of online learning tools. This gap in tech makes it hard for some kids to use new ways of learning. The lack of stuff makes it even more unfair for kids in city spots vs country spots, and makes it hard to give all kids the same chance to learn good..

2.   Teacher/Caregiver Digital Know-how: Call for training programs:

A lot of early school teachers and caregivers don't have the tech skills needed to use digital music tools well in their teaching. We need good training programs that help teachers know and feel sure to use these tools right and well in class. If they don't get enough training, teachers might not use digital tools much, cutting down how much they help kids learn. As tech skills turn into a key part in today's education, the schooling system in Nigeria must put teacher growth first to fill this gap.

3.   Culture Views: Some teachers like old ways of learning:

In some places in Nigeria, old ways of learning by stories, songs, and clapping games are much liked. Even if tech can add to these old ways, some teachers think tech takes away focus rather than helps. These views on tech in learning can slow the use of tech in music classes. To handle these worries, a mix of old and new learning ways is needed. By showing how tech in music can add to, not just swap out, old ways, teachers can help make a better and more open learning space for kids.

Implications for Music Educators and Caregivers
a. For Music Educators:

Music teachers are leaders in bringing tech music gear into young kids' learning. This gives them a great chance to not just better their teaching, but also to add to the fast rise of digital music learning stuff. Here are many good things and chances for music teachers:

i.   Chance to make useful music learning stuff. With more people using digital places, music teachers now have the chance to make and share their own music learning stuff. This can be things like fun songbooks and learning videos to music lessons that fit well with the life in Nigeria. By using sites like YouTube, mobile apps, or streaming places, teachers can get their work out to a lot more people all over the world, making a steady flow of money while helping young kids learn better.

ii.   Creating local Nigerian music-teaching apps. Music teachers can be vital in making local Nigerian music-teaching apps. By mixing Nigerian folk songs, languages, and rhythms into these apps, teachers can give young ones fun and right-for-them stuff to learn. These apps can show kids old Nigerian music tools and local music types, giving them a cool way to know their culture with music. Making these apps can link the world's tech tools and the Nigerian local life.

iii.   Adding music business skills to teacher training. Music teachers need to learn how

to mix music business into their day-to-day work. This may mean learning to make digital content, get paid for music lessons, and use online platforms to market their skills. By mixing business ideas into teacher training, music teachers can turn their job into a more business-like career. This helps not just the teachers, but also brings new ideas and keeps the teaching world going strong.

For Caregivers & Teachers:

For caregivers and teachers, particularly those working with young children, the integration of digital music tools presents an opportunity to expand their teaching methods and enhance their professional growth. Here are the key opportunities for caregivers and teachers:

i. Learning How to Teach with Digital Tools. More and more, digital tools are used in class. This makes it important for teachers to learn about digital teaching. Both those who teach and those who care for kids should get help to learn how to use tech with music well to help kids grow. The help should teach them both how to use the tech and how to keep young kids into it in digital places. With these skills, those who teach will be more sure and good at bringing digital music into what kids learn every day.

ii. Rules for picking right digital music tools for kids. When adding digital tools to kids' early learning, it is key to make sure these tools fit their age and help them well. Teachers and caregivers must have clear rules and help to pick the right tools that match steps in growth and learning aims. For instance, even though music apps that kids can play with are fun, they need to be built to aid learning goals such as talking well, remembering things, and showing feelings. These rules would help teachers and caregivers choose well when they look for digital music tools to use.

iii. Working with music teachers helps bring tech into class. When music teachers and young kid teachers work together, they can make tech work well in class. Music teachers know all about music, beats, and playing music. Kid teachers know how kids grow and learn best. By joining hands, they can plan fun work that uses tech to help kids both in music and thinking skills. Workshops where both can share ideas and tools will let them use tech in the best way and make class more fun for the kids.

Future Directions and Recommendations:

For the purpose of effectively integrating digital music tools into early childhood education in Nigeria, there are numerous suggestions, such as the one concentrating on policy, entrepreneurial opportunities, and further research. In the first place, the government should make the funding of digital learning infrastructure its top priority so that the internet connectivity, modern devices, and affordable technologies could be available in every preschool in the country. This investment should also involve the inclusion of digital music education in preschool curricula, making it a crucial point in early childhood education. By putting digital music into the education system, the children will be able to have a richer and more attractive learning environment, and therefore, it will be possible to enhance their cognitive and emotional domains.

Secondly, business entities have a significant possibility of developing Nigerian-themed digital music apps. The apps can be built with such features as local languages, folk songs, and culturally relevant musical instruments that not only help kids learn but also cultivate the love for their cultural heritage. In addition to the need for app development, there are calls for online courses that train caregivers and teachers in digital music education. The above courses will introduce the educators to how the digital tools should be used in their teaching routines by providing them with the skills needed to be more effective. Through these courses the teaching practices and content delivery can be creatively adapted to the special requirements of early childhood learners who will also be the beneficiaries of such learning.

Finally, conducting additional investigation is essential to have a better understanding of the effect that digital music tools have in the early years of a child's education. Longitudinal studies might investigate the gains and losses of literacy, memory, and emotional signs of children using

these digital music tools, hence, generate a clearer picture of their efficiency. Another point is that the comparative studies that are carried out both with the use of traditional music education methods and with the procedures of digital music platforms can be fruitful in evaluating the strengths and weaknesses of the two while in tandem facilitate the informed, balanced integration of both methods. These studies are so powerful that they have become the cornerstone of future educational strategies and have been able to correctly direct the use of digital tools in early childhood education.

Conclusion

It is a matter of a fact that if employed properly, digital music technology can not only enhance the learning process but also the engagement and creativity of students. However, it should be noted that there are some difficulties to be tackled such as technological barriers, caregiver training, and cultural attitudes. The entrepreneurial scene no doubt offers educators of music significant chances to create and distribute local digital learning platforms. By effective integration of digital music tools, the gap between music entrepreneurship and early childhood education can be closed in Nigeria, thereby making learning outcomes sustainable among other benefits.

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