



Technology-Based Music Education In Nigerian Public Universities: Prevalence, Relevance, Challenges And Prospects

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ABSTRACT

This article reviewed the relationship between technology and music education in Nigerian public universities. The study focused on the impact of technology on music education in Nigerian public universities; looking deeply into its benefits, challenges, and prospective solutions. However, this study found that some of the major challenges affecting public universities that have adopted technology into their music education curriculum amidst several relevance it projects are lack of funding, inadequate teacher training, access to adequate software and hardware, and reliable electricity and internet network connectivity. These challenges alongside others mentioned in this work have hindered the implementation of technology-based music education in public universities in Nigeria. The study also highlights some prospective solutions such as the need for increased funding, adequate training on the use and maintenance of technological systems for music educators, provision and access to latest technology and software to increase teaching and learning of music, and enhanced creativity and the ability to develop unique styles of music. The study stressed on the need for professional development of teachers and students, and the provision of appropriate infrastructure to address these challenges. This work concludes that if public universities strictly adhere to the stipulated solutions, they will overcome the challenges of technology-based music education. The study suggests for empirical research on this problem to help ascertain the current state of technology-based music education adoption into the Nigerian public universities curriculum, and its relative implementations towards realization of prospective goals.

Keywords: Music Education, Nigerian Public Universities, Technology, Technology-Based.

INTRODUCTION

The current statistics of the population of universities in Nigeria, revealed that there are about 170 universities in Nigeria; 79 private, 43 federal, and 48 state-owned universities (NUC Bulletin, 2023), implying that government-owned universities in Nigeria are 91 in number as at the period of this study. Majority of these universities, both public and private offer music courses, but specifically concentrating on public universities, about two third offer music in federal and state universities respectively. The university of Nigeria Nsukka, was the first university to offer music degree courses with the autonomy to grant degrees for courses in nearly all fields of study, along the lines of the Euro-American university music education in 1961 (Okonji, 2015:50). The use of technology in music education is relatively new in the Nigerian educational systems. Thus, this new educational technological paradigm has its roots in the early days of audio recording technology in early 1950s (Oladiran & Iloegbunam, 2015:10); though with more of the traditional technology. In the mid-1950s and 1960s, recordings of traditional African music were made available through radio broadcasts and the distribution of record productions

(Anyanwu, 2017:15). Consequently, in the early 1970s, technological paradigm moved from the information and entertainment sector, to the educational sector, where educational programs were developed to make use of technological systems in the form of recording of audios (Amusan, 2013:2). Perhaps, technology-based music education in Nigerian public universities can be traced back to the 1970s, when the first electronic music studio was established at the University of Ibadan (Adedjoja & Oladiran, 2014:6); thereby enhancing efficiency and effectiveness as students and their lecturers engaged in practical learning. In the 1980s, music education in public universities began to incorporate the use of cassette tapes and reel-to-reel tapes. This added pleasure in the learning process, as students and lecturers could record, and replay what has been taught and learned, and had more opportunities to practice as many times as they could due to the reinforcement systems aiding performance and the feedback process. In a related development, by 1990s, music education began to make more visible use of technological systems such as computers and CD players (Tamayo, 2015:253).

From the early 2000s, technology-based music education in Nigerian public universities spiked up to become giant strides, more prevalent, with the introduction of music technological software and the internet. Thus, this adoring paradigm- technology-based music education is the use of technological systems such as computers software and hardware, and internet applications in the teaching and learning of music. The uninterrupted advancement of technology into a sustainable digitalization era, promoted the growth of the internet, which has led to an increased opportunities in the use of online learning tools including cloud-based technologies for education. Today, in addition to already existing software and internet apps, more and more varieties of technology are becoming relatively relevant, and in use for music education in Nigerian public universities. One of the most commonly used technologies for teaching and learning music is the digital audio workstations (DAWs) (O'Connor, 2018:34). The DAWs are software applications that allow the recording, editing, and mixing of audio sounds in music recording and production. Beside this, some of the most popular DAWs used in Nigerian public universities to study music are the Pro Tools, Logic Pro, Ableton Live, MIDI controllers, synthesizers, and samplers.

Majority of these technologies are inter-used with software such as the Ableton Live and Logic Pro to create and produce music. These technologies can function in specific aspects of music education such as composition, performance, and music theory.

Technology and Music Education in Nigerian Public Universities

Technology is the use of computer devices, tools, processes, and systems to achieve a goal. In the context of music education, technology is the use of digital tools and systems to create, record, and share music. This process includes the use of hardware such as computers, recording equipment, and musical instruments; as well as the use of software such as DAWs, virtual instruments, and notation software. Similarly, technology in music education can also include digital resources such as online tutorials, online courses, and sheet music. Technology can be very feasible in many different ways to support and enhance music education in Nigerian public universities. For instance, DAWs can be used to create and edit music, virtual instruments can be used to create a wide range of sounds, notation software can be used to notate and share music, while digital resources can be used to supplement traditional classroom instructions, and online platforms can be used to connect students and teachers globally, at ease. In addition, technology can be used to assess students learning processes, provide feedback, and track progress in the learning behaviours of students.

Obviously, technology is a valuable tool that can assist in expanding the possibilities of music education in Nigerian public universities. One of the most significant ways through which technology has impacted on music education in Nigerian public universities is by making music more accessible to a wider range of students (Arikpo & Lawal, 2019:1429). For instance, technology has allowed the creation of music education programs that are available online, and can be accessed by students who may likely not have access to the traditional music education programs. Technology has also made it possible for students with disabilities to participate in music education in new and innovative patterns (Yong, 2017:118). For instance, adaptive technologies can be used in creating new instruments that can be played by students

with physical disabilities. In terms of the teaching and learning processes, technology has built the capacity to access a wide range of musical content and online resources such as online courses, online tutorials, and other digital resources accessible to teachers and their students in music education (Welch, 2016; MacDonald, 2016; Russell, 2013). Technology has equally made it easier for students to connect with musicians to gain practical knowledge in the industry, and to also collaborate on projects.

The importance of technology in music education in Nigerian public university cannot be overemphasized in the 21st century, as technology has been used to create flexible teaching and learning environments that are adaptive to meeting the needs of individual students (Oladiran & Iloegbunam, 2015:8). Technology can help to personalize instructions tailoring it to the individual needs and interests of each student to enable every student learn at his/her pace, through the use of technological systems such as computers and music teaching/learning applications enabled by the instructor for teaching and learning purposes. It can equally be relevant in assessing students' learning in new and more effective ways; such as tracking students' progress over time, allowing teachers to know when and where to adjust their instructions (Anyanwu, 2017:15). In the educational setting, technology can be very relevant to providing real-time feedback to students, allowing them to immediately understand where they need improvements. This process of assessment can be much more effective than the traditional assessments, which may not provide the same amount of details or efficiency (Arioso & Lawal, 2019:1608). Music education can also tap from technology by gaining the ability to create new and innovative forms of music which can combine different styles, genres, and instruments. This process can pave way for the creation of new and unique sounds that would not have been possible without the use of technology. Additionally, technology can help in creating music that is interactive, allowing the listener to become a part of the musical experience. Consequently, innovations of this nature is capable of inspiring students and their teachers to exploring new ideas and approaches to music compositions, performance, and theory.

Obviously, technology has impacted so much on music education to those public universities in Nigeria who have adopted it into their music educational program. Most of these schools such as university of Nigeria Nsukka in the East; university of Ibadan and university of Lagos in the West; university of Port Harcourt in the South, to mention but a few samples, are doing drastically well in music education, probably because they have adopted technology specifically into areas such as music composition, music performance, and music theory (Amaegbe, 2018:52). In music composition, technology has been useful in creating and manipulating of sounds in new and innovative ways, including sound reinforcements, identifications and recognition of acoustic behaviours to sounds, and sound management in general. For instance, in music composition, teachers and students can use the DAWs to create and record their own compositions, as well as explore new compositional techniques. In terms of music performance, technology has been useful in aiding performance with the use of digital instruments, virtual instruments, and the MIDI controllers (Iroagalachi & Ofurum, 2017:44; Okonji, 2012:42; McFerran & Wanderley, 2011:25). Finally, for music theory, technology has been of help in creating digital scores, simulations, and tutorials to assist students (Abril & Gault, 2016), to easily learn and understand complex musical concepts, and equally create styles that could be reliable and absorbed into theoretical validations globally.

Technology-based music education in the university level has the potential to transforming music education in Nigeria, by creating more access to acquiring a wider range of musical materials and styles suitable for global competitiveness, and by introducing individualized learning aided by musical guidelines, and the provision of new opportunities for collaboration and creativity. In addition, technology-based music instructions can help in bridging the gap between the traditional music education and the contemporary musical practices and pattern. However, despite these well esteemed potentials, and magnificent benefits of adopting technology into music education in public universities, there are significant challenges that need to be addressed adequately in order to fully tap the potentials of technology-based music education in Nigerian public universities.

Challenges of Technology-Based Music Education in Nigerian Public Universities

Behind the numerous benefits of technology-based music education in Nigerian public universities, there are also numerous challenges contemporary to these. Some of these challenges include, lack of funding, lack of access to adequate training for teachers, lack of reliable internet, insufficient power supply, lack of access to hardware, lack of cultural relevant technology-based music educational resources, lack of access to appropriate technical support, issue of digital divide, issues of affordability, lack of local content for technology-based music education, lack of appropriate infrastructure, lack of support from the government and education authorities, change of resistance to change among traditional music educators, and the issues of digital literacy amongst teachers and students. These challenges have been revealed by several researchers (Anderson, 2020:55; Iwu, 2016:98; Seddon, 2016:315), thus were modified and discussed here in the context of the Nigerian educational system.

1. Inadequate funding: Technological equipment are always capital intense, as such the cost of purchasing and maintaining equipment and software can be prohibitively high. Many public universities lack the funds to train their teachers on how to use technology, which further limits the potential of technology-based music education. The case of the Lagos State Education District III is one significant instance of the lack of funding for technology-based music education. This district consists of six local government areas in Lagos state, and has a population of over 400,000 people; with only one music teacher who has been trained in the use of technology for the teaching and learning of music. Perhaps this teacher is responsible for providing music instructions and assessment to all the schools in the district, which implies that the activities will be too strenuous for one person, and that the level of music instruction will be very low. Thus, this shows that the schools are suffering from lack of adequate funding to build technology-based music education which could provide access to the large population of students at same time and pace.

2. Lack of access to technology-based training for teachers: In many cases, teachers in many public universities in Nigeria do not have the required skills to effectively use technology in the teaching of music in the classroom. This situation is mostly visible in the rural areas where teachers often have limited access to professional development opportunities and manpower growth. The outcome of this situation is that many teachers lack the skills and professional confidence to integrate technology into their music lessons, thus limiting the benefits of technology-based music education.

3. Lack of access to reliable internet: Many public universities in Nigeria lack efficient access to internet connectivity, some and some who are connected suffer from lack of effective and sufficient or simply put-poor network. This situation of poor network is prevalent in the rural area, although network in Nigerian is generally not stable; always dwindling. Poor network can cause instability in the effective teaching and learning of music.

4. Lack of access to hardware: Most public universities often lack the necessary hardware to effectively manage technology in a music classroom. This situation is visible as many higher institutions do not have computers for their teachers and students, which will make it difficult to use online resources or create digital music. In addition to this, many public universities lack the fund to purchase relevant software license and other necessary hardware such as audio equipment. Thus, this lack of hardware can be a major challenge to the effective and efficient application of technology in music education.

5. Lack of teachers' experience on the integration of technology into the music curriculum: Public universities many have access to the necessary hardware and software, and or the access to teaching their teachers the skills on how to handle these tools and apps, but teachers may not have the necessary experience of where, when, and how to effectively use these tools in the classroom, because it is not included in the curriculum. Beside these, many teachers are not familiar with the best practices for using technological devices in the teaching and learning of music in the classroom.

6. Lack of culturally relevant technology-based music educational resources: In Nigerian public universities, majority of the technological based music educational resources are developed in western countries, and may not be relevant to the cultural context of the Nigerian society. A typical example of the lack of culturally relevant technology-based music education resources is the use of

western notation in the teaching and learning of music. Thus, many music students in Nigeria have not been exposed to western music notation, and may often not be familiar with its conventions. However, this can make it difficult for students to understand and engage the materials in the learning process. In addition, western notation may not be the most effective way of representing the music of other cultures; as such it is important to find or create culturally friendly and relevant resources that can be used in technology-based music education.

7. Lack of access to appropriate technical support for technology-based music education: In many public universities in Nigeria, there are no dedicated technical support staff to help in the implementation and maintenance of technology-based music education. This situation can lead to frustration and difficult in using the technology effectively, during music lessons. Thus, without appropriate technical support, teachers may not be able to fully take advantage of the benefits of technology-based music education. However, one specific way that lack of appropriate technical support impacts on technology-based music education is in the aspect of software updates. Many software programs need regular updates to function effectively. Mostly, without access to technical support, music teachers may not be able to update their software, which can lead to compatibility. In addition, teachers may not be able to troubleshoot any technical issues that arise when using the music software. However, this can be particularly problematic for students who are attempting to learn music in a digital environment.

8. The issue of digital divide: In Nigeria public universities, there is a large disparity in access to technology between urban and rural areas. This digital divide may make it difficult for rural schools to effectively implement technology-based music education. For instance, school in rural communities may not have access to a high-speed internet or hardware required to running certain programs. Consequently, this situation can put students in rural areas are a disadvantage when it comes to the teaching and learning of music, using technology. One significant instance of this situation is the lack of electricity in rural areas. This is a major challenge to implementing technology-based music education, as it means that schools cannot use computers or other devices that require electricity, unless they have the fund to run generators. Also, the lack of electricity can impact on students' ability to access online resources or complete assignments that require the use of electrically operated computer and other digital device. Thus, this challenge can have a significant impact on students in rural building an intensive learning ability and equally participate in technology-based music education.

9. The issue of affordability: Many technology-based music education programs are not financially accessible to public universities in Nigeria. This circumstance is more obvious in schools located in rural areas, who often have fewer financial resources than schools located in the urban areas. Sometimes schools may be able to afford the initial investment in technology, but may not be able to afford the operating costs of software updates, repairs, and other running costs and expenses. A major specific aspect of the affordability challenges is the cost of data for the operation of technology-based music education by the public schools. Many internet service providers in Nigeria have high tariff for data which can be a barrier to accessing online resources for technology-based music education. In addition, some public universities may not have the infrastructure to support a high-speed internet connections, which further limits their ability to use online resources. This can however put rural public schools at a significant disadvantage when it comes to implementing technology-based music education.

10. Lack of local content: In Nigerian public universities, most of the technology-based music education content available is created in other countries, and such may not be culturally relevant for Nigerian students. This makes it difficult for students to engage on the content and learn effectively. It is important for technology-based music education to be culturally relevant in order to be effective and efficient. On this ground, there is need for more locally developed content that showcases the culture and context of the Nigerian society.

11. Lack of appropriate infrastructure: In Nigeria, many public universities do not have the necessary infrastructure to support the use of technology in the classroom. This challenge includes the lack of computers, lack of reliable internet access, and other necessary equipment. Obviously, without the proper and adequate infrastructure, it is difficult for public universities to effectively implement

technology-based music education. Thus, this challenge can lead to frustration of teachers and students in carrying out classroom activities, and can equally limit the effectiveness of the music program in the school.

12. Lack of adequately support from the government and educational authorities: Technology-based music education is still a relatively new concept in Nigerian universities, and as such has witnessed a lack of support and recognition from educational authorities, and the government at large. This situation can make it difficult for public universities to receive the appropriate funding and resources they need to effectively implement technology-based music education. Also, a lack of support from the relevant authorities can lead to lack of motivation for music education amongst teachers and students.

13. The issue of digital literacy amongst teachers and students: To effectively apply the technology-based music education, teachers and students of public universities have the required digital and computer literacy skills. This situation includes them being able to use computers, software, hardware, and the internet in general, effectively. It is obvious that there is insufficient resources and training for teachers and students to adopt technology-based music education meaningfully.

14. Resistance to change amongst music educators: In Nigerian public universities, most music teachers have become used to the traditional music educational system, and find it difficult to change their status quo, or adopt what is in the trend. This makes them believe that technology-based music education is mostly a western pattern, as such should not be adopted in our society. They also use this negative ideology to reprogramme the mentality of the students, who then agree to this principle. This situation helps to cause set-back in the positive shift towards digital teaching and learning, which is the prime objective of technology-based music education.

15. Inadequate/lack of electricity supply: The electricity generation in Nigeria is very poor, and negatively impacts on barely all activities in the country, schools inclusive. Nigerian public universities suffer a lot of setbacks due to the poor and consistent manpower general and supply. These schools especially those in the rural areas find it difficult to operate effectively because there is no power supply to run their facilities; and even when they manage to purchase a big generator, the running cost of maintenance and petrol is very high; thus making the school not to use the generator always, which also affects the usage of other facilities in the school. Universities in the urban areas often suffer same problem which in general impacts negatively on the adoption of a technology-based education in Nigeria.

Prospective Solutions to the Challenges of adopting Technology-based Music Education in Nigerian Public Universities

The use of technology in music education has become increasingly popular in recent times, as Nigerian public universities have been at the visible end of this trend. One of the current states of technology-based music education in Nigeria as indicated in a survey of music education in Nigeria, found that only 10% of respondents from schools studied, who have adopted technology-based music education, reportedly agreed to have acknowledged, accepted the pros and cons of technology-based music education, and as such have received formal training in technologically based music instructions (Koko, 2016:162). Following this statistics, it is quite arguable that more than half of the public universities in Nigeria that offer music have not yet recognized the relevance of technology to music education. Besides, it is believed that several challenges have been posing threats and reasons for the reluctance in adopting technology into music education. However, poor educational funding, pre-teacher training and oversight in the need for a change of status quo, lack of confidence in using technological systems in schools, majorly due to the lack of understanding of how to integrate technology into the music curriculum, and the lack of awareness of the potential benefits of adopting technology-based music education in Nigerian public universities, have been surveyed to be the major hinges (Arikpo & Lawal, 2019:38). Based on these, researchers (Oladiran & Iloegbunam, 2015:13; Parasiz, 2018:25; Mulder, 2017:34; Hess, 2016:23), have identified and recommended some prospective solutions which were

modified and proposed in this work, to help in cubing the fears of Nigerian universities whose operations are inseparable from technology for effectiveness and efficiency in the educational system.

1. Adequate Funding: A potential solution to the challenge of lack of funding is to establish partnerships with local and international organizations to provide financial support. For instance, partnerships with local businesses, NGOs, and international organizations can provide financial support for technology-based education programs in public universities. Also, the government can allocate funds especially for technology-based education, or provide incentives for businesses to donate technology/resources to public universities.

2. Access to technology-based Teacher training: A potential solution to the problem of lack of teacher training is to establish teacher training programs specially focused on the promoting of technology-based education. Perhaps, these programs may be offered in the universities, or done online. Teacher professional development/on-the-job programs could be established to help teachers continue to develop their professional skills so as to perform more effectively and efficiently. In addition, mentorships between experienced teachers and novices or amateurs teachers could help to support, encourage, and build a system to adopt the use of technology-based education in public universities. In addition, the use of distance learning may help to give teachers the pre-requisite learning opportunities required to gain the knowledge of teaching with technological systems. Thus, with the advent of the internet and other technologies, it is possible for teachers to access training and professional development opportunities from anywhere in the world. This will be beneficial to teachers in rural areas, who often have limited access to in-person training. Besides, some organizations are working tirelessly to provide free or low cost online courses for teachers in technology-based education in Nigeria public universities.

3. Access to reliable internet: In order to address the challenge of access to reliable internet, one major option is to use satellite internet that does not require physical connection to the internet. The satellite internet is capable of providing a high-speed access everywhere including to schools in remote areas. Another reliable option is to use a wireless internet that uses radio waves to transmit data. Perhaps, wireless internet can be more reliable than the wired internet, and can be set up more quickly. Thus, public universities can do better by using cellular data to access the internet, as such becomes more reliable than other options available in some areas.

4. Reliable and adequate access to hardware: One major solution to the challenge of access to hardware is to establish a “lending library” of technology resources. This may include providing a pool of computers, tablets, and other devices that could be loaned to students, their teachers, and schools. In addition to this, these could be programs to refurbish and donate fairly used technology systems to schools, teachers and students in need of them. Another way to addressing this challenge is to partner with local organizations or business to provide hardware at a discounted price or for free. Finally, public universities can explore the use of virtual machines, which allow for the use of technology without the need for physical hardware.

5. Lack of culturally relevant resources: This challenge can be addressed by working with local musicians and educators to create culturally appropriate resources. For instance, these resources may include songs and instructional materials that reflect the culture and heritage of the local communities. Also, local experts may be consulted to ensure that the resources are culturally adequate and relevant to the music students in Nigerian public universities. This strategy would help to ensure that students are engaged, and that the resources are meaningful to them and their teachers.

6. Issue of lack of access to appropriate technical support for technology-based education: A potential solution to this challenge is to establish a network of technological support specialists who can provide assistance to public universities and their students. These specialists may also provide support via phones, emails, or in-person visits. They can also provide resources such as instructional videos and manuals, as well as troubleshooting guides. Additionally, technology companies can be encouraged to provide free or discounted technical support to these schools, their teachers and students who are using their products.

7. **Issues of digital divide:** The challenge of the digital divide for technology-based education in Nigerian public universities can be addressed using a number of solutions. One major solution is to provide internet access to these schools, especially those public universities in rural areas, through the use of satellite internet or wireless hotspots. Also, the government can provide subsidies for internet access, or work with internet service providers to provide lower-cost plans for schools and families in rural areas. Finally, the provision of computers and other technological devices to these schools in rural areas may help to tackle this challenge. Perhaps, this could be done through donations from businesses or through government programs.

8. **Issue of affordability:** The challenge of affordability can be addressed by providing low-cost or free access to technology-based education resources. For instance, open-source software can be made available to schools, teachers and students at low or no cost. Also, there could be initiatives to provide computers and other devices to public universities who are in need of these devices. Thus, another way of addressing this problem is to partner with local businesses or organizations, in order to provide discounted or donated technological resources for music education. Finally, these public schools can equally consider implementing a “bring your own device” policy, to enable students and teachers use their own personal devices for music educational purposes.

9. **The issue of local content for technology-based music education:** This challenge can be addressed through the development of local partnerships. However, while working local organizations and expatriates, it may be possible to develop a culturally relevant content for technology-based music education in Nigerian public universities. This situation may involve working with traditional musicians, ethnomusicologists, and several other related experts to develop contents that are meaningful and relevant to the teachers and students of music in Nigerian public universities. Perhaps, this form of partnership can also help to build capacity within the local communities to help develop and maintain technology-based music educational resources in these schools.

10. **The issue of infrastructure:** The challenge of lack of infrastructure can be addressed by establishing “tech hubs” in rural communities where public universities are sited in Nigeria. The tech hubs sited in these areas could help to provide access to computers, internet, and other resources for teachers and students of these schools. Also, the government can provide grants for these schools to upgrade their infrastructure. However, another way of addressing infrastructural challenge could be by providing a “movable tech hubs” that can be taken to these public universities in rural areas for short term periods. This will create room for teachers and students to have access to technology without having to travel to a different location.

11. **Issue of support from the government and education authorities:** The challenge of lack of support from the government and educational authorities could be addressed by raising awareness of the benefits of technology-based music education. Perhaps, education authorities can be provided with evidence of the effectiveness of these programs as well as information on how they can support teachers and schools in implementing the programs. In addition, advocacy groups can equally be established to help lobby for increased support from education authorities. Thus, these advocacy groups may include teachers, administrators, student unions and parents who are committed to helping to promoting technology-based music education in public universities in Nigeria.

12. **The issue of digital literacy:** The challenge of digital literacy can be addressed by providing training for teachers on how to use technology in the classroom, as well as how to teach digital literacy skills to students in music education in public universities. This training can be provided through workshops, online courses, or peer-to-peer mentoring. In addition, another one of addressing this problem is to incorporate digital literacy into the music curriculum, so that all students will have an opportunity to develop these skills. This can equally be done through the use of digital literacy standards or by integrating digital literacy into existing subjects, such as language arts, performance arts, and others.

13. **The issue of resistance to change amongst traditional music educators:** This challenge could be addressed by providing professional development opportunities that are designed specifically for teachers and students. These opportunities may include workshops that focus on the relevance and

benefits of technology-based music education, as well as training the teachers and their students on how to use technological resources in the classroom. Also, traditional music educators may be invited to participate in the development of technology-based resources, so that they will feel a sense of ownership and possession, and can equally see the value of technological resources in studying music in public universities in Nigeria.

14. The issue of electricity in public universities in Nigeria: Apart from the use of solar panels, universities can consider using generators or battery backup systems to ensure a reliable source of electricity in the case of lack of power supply, poor voltage, or while there is low temperature/poor weather to give adequate sun to charge the solar panel. Generators can provide backup power in case of power outage, and battery backup systems can provide power when the grid is down. In addition to these, public universities in Nigeria can explore electricity by using more energy-efficient equipment and appliances, such as LED lighting and energy-efficient computers. Finally, these schools can consider making changes to their building design and layout to reduce their overall energy consumption.

15. The issue of integrating technology into the music education curriculum: The process of integrating technology into the music education curriculum needs professional knowledge. Without adequate training on how this is done, music educators may not be able to build an effective curriculum to help achieve technology-based music education programs, teachers may not be able to use technology effectively while teaching, and to its full potential. Perhaps, teachers may need adequate training to enhance effectiveness on how to choose appropriate music technological tools for the specific goals and objectives, where, when and how they are appeared in the curriculum. Also, teachers may need support in creating lessons and activities that effectively make use of technology to teach music in the classroom. Teachers may also outline in the curriculum when, where, and how to seek help in times of troubleshooting technical issues arising from using technology in the classroom. Finally, teachers should also outline in the curriculum, as a guidance on how to assess students on their performance, using technology-based music education tools.

CONCLUSION

The current state of technology-based music education in Nigerian public universities, has a mixed nature. This is so because on one hand, there are some excellent music programs that are making wave in the use of technology to provide a high-quality music education globally outstanding. On the other hand, many public universities in Nigeria are still ignorant of these developments; some lacking interests to adopt it, others who claim to have interests for it, cry loud not having the required human capacity and other material resources necessary to run a technology-based music education. Perhaps, this work acknowledges that technology has the potential of greatly improving the patterns of music pedagogy in Nigerian public universities, though with several accompanied challenges which need to be addressed alongside. Some of these major challenges include lack of adequate funding, lack of adequate and trained teachers on the application of technology in music instructions, lack of infrastructures to aid technological systems, and the lack of other relevant resources to help facilitate the adoption of technology-based music education. Also, there is lack of consistency in the general curriculum of music education across the country. Thus, this leads to divergence in music courses in the curriculum; as some universities under some regions are having a more developed and standardized music education programs than others.

However, this study has been able to highlight some progressive steps that have been made in recent times, thus offering suggestions for future developments. It was therefore, concluded that there should be relentless efforts in incorporating technology into music education curriculum in Nigerian public universities, no matter how huge the project may look in its initial phase. This is because technology-based music education has helped Western education in several fields in schools within and outside Nigeria; public universities in Nigeria who have adopted this new technological paradigm can attest how technology has helped to revolutionize the way music is being taught and learnt. Despite its hinges, there is a growing quest of philosophical intuition on its prevalent relevance and interest on adopting

technology into music education, and other fields of study at large in Nigerian public universities curriculum.

Obviously, in order to achieve this success in technology-based education, music inclusive, several organizations and individuals are working tirelessly towards the improvement of the undetachable and beneficial relationship between technology and the educational systems, to help enhance the activities of teaching and learning. One of these prominent organizations in the Nigerian educational sector is the Nigerian Music Teachers Association. This body works to help promote an all-round hinge free technology-based music education across public universities in Nigeria, and also helps to initiate professional development programs for music educators in the Nigerian educational systems.

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