

AN EVALUATION OF THE USE OF TECHNOLOGY IN TEACHING AND LEARNING OF MUSIC IN PRIMARY TEACHERS TRAINING COLLEGES IN KISII COUNTY, KENYA

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ABSTRACT

The traditional instruments used to teach music in Kenya have been outdated and thus regarded as boring, inefficient and ineffective. Use of technology in music education is not a new venture but has assisted music educators for centuries. Harpsichord, computers, electronic keyboards, CDs, and piano are examples of technological gadgets that are of great importance to those who use them today. The purpose of this study was to evaluate the availability and the use of technology in Primary Teachers' Training Colleges, PTTCs in Kisii County, Kenya. The study employed, a mixed method approach of data collection and analysis. Purposive sampling technique was used to select all the four PTTCs in Kisii County, and music teacher students. Questionnaires and in-depth interview guides were used as the research instruments. Statistical Package for Social Sciences (SPSS) programme was used to process the data, and analysis was done using descriptive statistics to include frequencies and percentages and was presented in tables and pie charts. Qualitative data was analysed and categorized into themes and presented in narrative form. The study found that providing access to the required technological resources such as keyboards, pianos, television/videos, audio CDs and radio resources for all students, lack of electricity, provision of effective administrative support and technical issues were significant challenges to the use of technology in PPTCs. It was concluded that chalkboards, local resources, flip charts, audio CDs, recorders and pianos/ keyboards were sufficiently available for use in the teaching and learning of music. The study recommends that the Ministry of Education should provide adequate funds to purchase music instruments and organize training seminars for tutors in PPTCs. Further, administrators of PPTCs colleges should adequately plan music theatres to facilitate electricity access points for use with the available technology.

Keywords: Music education, technology, Primary Teachers' Training Colleges

1. INTRODUCTION

The use of technology in music education is not a new venture; it has assisted performers and music educators for centuries. The organ, harpsichord and piano are examples of technological gadgets that were of great importance to those who first used them, as most recently invented devices such as computers, electronic keyboards, and CDs, are to those who use them today. In the contemporary society, the field of education has seen a rapid change and continuous advancement on the use of technology as a tool for teaching and learning. Ruismäki (2009) notes that new technology is increasingly present in modern music education from the elementary school to the university level. Electric and non-electronic devices, hardware and software, the use of the internet for musical collaboration and storage systems, among others, are present in most music classrooms.

Thus, the role of technology in contemporary societies cannot be ignored. Researchers have interrogated the use of digital technology, in promoting access to music education in schools (Achola, 2007). Recommendations made include introduction of a course in music technology in higher education institutions and training teachers so that they can develop competence in computer and other technological skills. Studies in e-learning for enhancing access to music education have also been evaluated and discussions noted on how this learning tool can be used to disseminate musical knowledge by the tutors. However, the extent of use of technology in the teaching and learning of Music is not evident. Consequently, the growth of the global economy and the information-based society has pressured education systems around the world to use technology to teach students the knowledge and skills they need (UNESCO, 2012). According to Ogame (2011), integration of Information Communication Technology (ICT) as technological advancement has brought about profound changes in education and other fields whereas Bitter & Pierson (2005) observe that “technology literacy is a given order in our society” which is an age where the ability to read, write and account is not enough as technology is being widely adopted. Modern technology, when used as instructional tools has the potential to transform teaching and learning processes. It has given teachers and learners an opportunity to explore new ways of learning. The integration of educational technology into the classroom has a major role in creating effective learning and teaching environments. For example, many different computer programmes and software currently used, make music-making, composition, and accompaniment, practice and improvisation easier and more meaningful (Brown, 2014).

Technologies used in music education, from traditional audio and audio visual to the newest digital technologies, provide powerful tools for creative teachers and support diverse learners. It offers educators a variety of modern tools that can be used in a classroom setting (Berrett, 2006). Within increasing changes in the global economy, the music education sector has to enhance its music instruction technology in order to participate effectively in the global technological age (Achola, 2013). Technological development has a profound impact on music education at all levels, however, in this study; the focus is on evaluation of its use in primary school teachers training colleges specifically in Kisii County, Kenya. This was in recognition of the fact that the availability of technology is not transformative on its own; it requires teachers who use them to improve student teaching and learning. The Kenya Institute of Education (2004) observes that

unless trainers' model effective use of technology in their own classes, it will not be possible to prepare a new generation of teachers who effectively use the modern tools for learning in the 21st Century. This, therefore, means that a technologically advanced teacher is important in the classroom in order to help expose learners to various educational technologies and to adapt to this changing situation. Since the use of technology will have an impact on teaching of music in both teachers training colleges and by extension primary schools teaching and learning, it is therefore vital to assess its use and impact on PTTCs.

Loughran (2006) contends that teacher education is a pre-service and in-service teacher preparation where student-teachers seek to develop knowledge and skills of teaching, and to learn how to competently apply this in theory and practice. Primary Teacher Education (PTE) in this context is perceived as a pre-service education where individuals are equipped with knowledge, skills and attitude in order to educate learners in primary schools in Kenya. The curriculum used in PTTCs in Primary Teacher Education (PTE) enables the teacher trainees to study ten subjects in first year and then specialize in the second year. They specialize in either Sciences (option A) or Arts (option B); music is categorized under the latter option. Nart (2016) stated that, in the contemporary society it has become an inevitable requirement for a teacher who guides his student to master and use the technology in the classroom and integrate it in the lessons. Training is, therefore, necessary for teachers to feel comfortable using the new technology for effective teaching and learning. It is imperative that teachers adjust to the technological revolution not only to prepare themselves, but also prepare their students for the technological real world. In their study, Celik and Keskin (2009) found that additional training and experience in implementing instructional technology in pedagogical processes lead to teachers who are comfortable with instructional technology, and who used it effectively. Teacher Education is a fundamental component of any established system of education and the custodian of the society's culture (Lucas, 1968). Its main goal is to develop the basic theoretical and practical knowledge about the teaching profession. However, this assertion by Celik and Keskin (2009) did not put into consideration the use of technology in music education.

Primary Teacher Education in Kenya is an essential component of the Kenyan education system. The course being the main pillar in the establishment of primary school system of education in Kenya denotes that technological knowledge and skills acquired in the process of PTTCs could be employed in teaching and learning of music in primary schools. Training aims at helping student-teachers to incorporate technology into their teaching, and to create relevant teaching and learning materials. It is therefore necessary to evaluate the use of technology in primary school teachers training colleges since PTTCs prepare teachers for primary level of learning. Music education in Kenya began in 1988, four years after the inception of the 8-4-4 system. Even then, the subject was not taken very seriously at primary level as it was only examinable in secondary and tertiary schools. Development of music academically faced a lot of challenges. In line with this, resources towards music education, and thus music technology have been thwarted for a long period. Actually, even basic resources meant for teaching music, such as classrooms and teachers have been diverted to 'weightier' subjects (Wanyama, 2014).

Obegi, (2015) notes that there are still many challenges affecting education in Kisii County, for example; staff shortage in schools, lack of facilities such as laboratories and classrooms, electricity and inadequate technology in some institutions, poor teaching methods and unqualified staff. The population of Kisii County is also rapidly increasing and as the population increases, the number of educational resources needs to be assessed to ascertain its availability, relevance, use and if need be added to accommodate the increase. By 2015, there were 467 primary schools with 6,278 teachers against four primary teacher-training colleges: one public and three private primary school teacher-training colleges in Kisii County (Obegi, 2015). This implies that there is a mismatch between the available training facilities versus the student-teachers population. With this rapid increase in population and the changing trends in technology, this study will provide crucial information on the status of technology used in PTTCs for teaching and learning in the county. Moreover, the use of technology as a tool for facilitating students' engagement and understanding of music, accounts for the current and future face of the Kenyan primary school music education. It is therefore important to evaluate its current availability and applicability in teaching and learning in primary school teachers training colleges.

2 RESEARCH DESIGN AND METHODOLOGY

Research Design

This study employed a mixed method research design: a procedure for collecting, analyzing and mixing both quantitative and qualitative techniques in a single study. According to Creswell and Clark (2007), mixed methods approach encourages the use of multiple worldviews by combining inductive and deductive thinking which helps to answer questions and provide more comprehensive evidence in numbers and words for studying research problems than either quantitative or qualitative. This research method was appropriate for this study as it allows the researcher to collect both qualitative and quantitative data. Moreover, the researcher was able to make observations to compliment the data collected so as to comprehensively address the research questions.

The study employed specifically an embedded mixed methods research approach where qualitative data was collected and analyzed within a quantitative research. In this case, quantitative was the primary data supported by the qualitative data. As opposed to triangulation design, data here is analyzed simultaneously. Mixed methods research provides strengths that offset the weaknesses of both qualitative and quantitative research.

Target Population

Since the study evaluated the use of technology in teaching and learning in PTTCs, data was drawn from music tutors; student-teachers from both the first years and only second years who take option B subjects, as well as the principals of the chosen PTTCs as respondents. Eight music tutors, Four principals and one thousand five hundred students from primary teacher training colleges.

Description of Sample Size and Sampling Procedures

The study included all the four primary teachers training colleges and four principals through purposive sampling technique who took part in the study. This is because there were only four PTTCs in Kisii County and thus the only source of information in this regard. As for the music tutors, one was included per college through purposive sampling technique to take part in the study. As for the students, 10% of the target population of the study, which was 1500 students, was sampled to participate in the study. This is in line with Mugenda and Mugenda (2003) that when the size of the population is known, then between 10 to 30% suffices as a representative sample.

The sample for this study was therefore one hundred and fifty-eight (158) respondents, distributed as follows; four principals, four Music tutors, 150 music student-teachers. Sampling was necessitated by difficulty of subjecting a whole population of interest to investigation due to limited monetary costs and time. Probability and non-probability sampling procedures were used in this research to obtain a sample from tutors and student-teachers. It is about random selection, whereby everyone in the population has equal chance of being selected. Gay & Airsian (2009) contend that a probability sampling procedure also known as 'random' or 'chance' selection has every item of the population given an equal chance of inclusion in the sample. Probability sampling was chosen because the researcher sought to make generalizations of this study.

Cohen, Manion and Morrison (2007) say that a probability sample is useful because the researcher is able to make generalizations since it seeks representativeness of the wider population. This method was also adopted because it gave equal chances of participation to each member of the population. The study specifically used simple random sampling technique as the preferred probability sampling technique for this study to select the student-teachers. This method was found to minimize bias amongst the respondents while easing data collection process. However, it was inevitable to use non- probability sampling because the researcher wanted to get vital information from particular sources. This is due to its inability to afford any basis for estimating the probability that each item in the population has the right of being selected to constitute a sample (Kombo and Tromp, 2006).

The study employed purposive sampling where principals and tutors were selected purposive for being in charge teaching the student-teachers. Principals and tutors also had more information regarding use of music technologies in various schools. Purposive sampling was used in this research to select respondents with special responsibility because the researcher presumed that they had adequate knowledge and factual information required for this study. The principals are in-charge of administration thus the allocation of funds for acquisition and maintenance of technology while tutors were expected to use the available technology in teaching of music.

Simple Random Sampling, according to Mugenda and Mugenda (2003), is a method of sampling which involves giving a number to every subject or member of the accessible population, placing the number in a container and then picking any number at random. This technique was used in this study to select the first year and second year option B student-teachers to answer the questionnaires. The student population was stratified based on gender and distributed equally to

have 50% female and 50% male to ensure uniform inclusion of views. Yes and No were written on a piece of paper, folded and placed in a tin and the participants were each given a chance to pick one. All those who picked yes were given time to respond to questionnaires. The respondents sample distribution frame is summarized in **table 1**.

Table 1: Respondents Sample Distribution Frame

Respondents categories	Number	Sampling Technique	Sample Size	Research Instrument
Principals	4	Purposive	4	In-depth interview guide
Music tutors	4	Purposive	4	Questionnaires/interview guide
Student-teachers	Aprox. 1500	Stratified/ Simple randomsampling	150	Questionnaires
Total	1508		158	

Thus, all the four (4) principals and music tutors were selected purposively while 1500 Student-Teachers were selected through random sampling. The total sample was 158 participants. From **table 1**, the student-teachers are the primary source of data for this research, as highlighted in the study objectives.

Description of Data Collection Instruments

Primary data was collected from the respondents using in-depth interview guide, observations and questionnaires. Each of these instruments are described in details below. Secondary data was collected from books, journals and websites.

Questionnaires

The participants were issued with a questionnaire to seek their views and concerns in relation to the use of technology in their institutions and in music class lessons. Students and their teachers were given the questionnaires to fill in their responses. The rationale behind this was to compare students' data to teachers' data for triangulation and error detection purposes. The questionnaires that were used in this study had a combination of open-ended and closed-ended items. The open-ended questions gave the participants room to provide further explanation regarding the items. Questions related to music technology as well as general bio-data of the respondents such as gender, were included in the questionnaires (**Appendix 1**).

In-depth interview guide

This study also used structured-direct and unstructured direct type of interviews which were conducted with the tutors and principals of selected primary teacher education institutions. The principals were viewed as being involved in acquiring and monitoring music education

technology that are used in their institutions. An interview guide aids the researcher in measuring what a person knows and thinks about on a particular issue (Mugenda & Mugenda, 2003). In this study, the interviews were used to obtain detailed views of the college principals and music tutors on the availability and use of technology in music education.

Validity and Reliability of Research Instruments

To increase the content validity of the instruments, the instruments were given to the researcher's two supervisors for scrutiny and advice. A panel of specialists also checked on the content coverage by assessing what concept the instrument was supposed to measure. The experts also determined whether the set items accurately represented the concept of this study. The content of the instruments was based on the authorities' advice and comments. Their comments and suggestions were incorporated into the final draft of the research instruments. Data collection validity was enhanced by instrument triangulation whereby different sets of instruments were used. Method of triangulation was employed by use of questionnaires, and in-depth interview guides to collect similar information. The data obtained from the different sources was compared for consistency and similarity with regard to the themes on use of technology in music education.

Pilot Testing

Before going to the field with the instruments, a pilot study was undertaken in one of the primary teacher education institution to determine the validity and reliability of the instruments. The main reason for a pilot study was to assess the validity of the instruments, the correctness of some concepts, the adequacy of the method and instrument of measurement (Bless & Smith, 1995). Reliability of an instrument is the degree to which a test consistently measures the desired construct. It is the ability of the research tools to yield consistent results or data after repeated administration. Reliability therefore is the accuracy of the results obtained by use of a research instrument and not about the instrument itself. The purpose of reliability is to determine how much error is present in the test score. Research instruments in this study were subjected to a pre-test so as to find and amend any ambiguities, inconceivable statements and errors.

Data Collection Procedures

Data collection procedure is the process of gathering the required information at the field using the instruments recommended for a given study (Mugenda & Mugenda, 2003). The tested and approved research instruments were delivered and administered by the researcher with the assistance of the music tutors from the selected institutions to the sampled respondents. The questionnaires were distributed to the selected respondents who answered the questions individually. The researcher then received back the questionnaires after they had been duly completed.

Description of Data Analysis Procedure

This research used both quantitative and qualitative data analysis procedures. Data analysis involved processing the data to answer the research questions. After data collection, the researcher organized, edited and systematically coded the data to facilitate analysis. The quantitative data obtained from the closed and opened-ended items in questionnaires was coded by categorization, qualification, processed, and then entered into Statistic Package for Social

Sciences (SPSS) software where database was developed, to facilitate analysis, description and inferences to this study's research questions. The data summaries were represented using frequency tables and pie charts respectively. The qualitative data was derived from in-depth interviews, and from the open-ended items on the questionnaires. The interim data analysis of the qualitative data begun in the field as the researcher identifies emerging issues during the interviews. The researcher categorized data into themes according to the research questions and thereafter use thematic analysis to discuss the findings and present them in form of narratives and direct quotes. Qualitative data was analysed and interpreted within quantitative data. This process enabled the researcher to draw the research conclusions and make the recommendations.

Ethical Considerations

Ethical considerations are important components of a given research since it involves collecting data from the people about the people. In this study the researcher observed ethical code of conduct by first, seeking consent from principals from the sample institutions before carrying out research.

The researcher disclosed to the participants in advance the purpose of the research and voluntary consent was sought before in-depth interviews were carried out. The same was done for other respondents before they filled in the questionnaires. Anonymity of the respondents was assured and maintained during the whole process of the study. Confidentiality was maintained and all the respondents were assured that the information given was used solely for the purposes of the study. The researcher has acknowledged all the materials picked from other sources and authors using American Psychology Association (APA) method in the entire study.

3. DATA PRESENTATION AND INTERPRETATION

Demographic Information

Respondents' background and demographic information was captured to ascertain their suitability to provide information necessary to the study. This was analysed and is presented in the subsequent subsections. According to Sergeant and Himonides (2016), there is a slight bias in gender, towards male, for interests to music technology. The student tutors were evenly distributed in terms of gender with male student tutors who participated in the study being 50% as well as the female participants. However, as for the tutors, majority (75%) were male with only 1 female tutor (25%) participating in the study. The finding shows that there was adequate gender representation in the study thus capturing views from both genders. From the analysis of the study findings, all the student respondents (100%) were in their youthful age bracket, which is the expected age of students in teacher training colleges. Youthful student-teachers are expected to experience more music technology due to the advancement of technology currently, as compared to a while back. This would enable them to effectively pass on the skill to their primary school students during their teaching career. As for the tutors, all the 4 tutors were aged above 40 years. From the background information gathered by the researcher, all student-teachers (100%) had carried out 3 teaching practices, with all the second-year student-teachers taking option B as their subject area. As for the tutors, 50% had bachelors' qualification with the other 50% having master's qualification. Further, all the tutors had over 5 years (8 – 16 years) of teaching experience at their respective colleges teaching music as a subject. In terms of distribution, 3 (75%) of the tutors were from private colleges with the other one (25%) being

from a public college. This distribution shows adequate teaching experience of the subject among tutors and representation of views both in private and public colleges.

Available Technology for Use in Primary School Music Teacher Education

In the first objective, the researcher sought to establish the available technology for use in the teaching of music. Student-teachers and music teachers were asked to identify the technology which was available to them. The findings were summarised into frequency and percentages and presented in **table 2**.

Table 2: Available Technology

Available Technology	Student-teachers				Tutors			
	YES Freq	%	NO Freq	%	YES Freq	%	NO Freq	%
Chalk board	150	100.0%		0.0%	4	100.0%	0	0.0%
Overhead projectors	50	33.3%	100	66.7%	2	50.0%	0	0.0%
Computers/Laptops	50	33.3%	100	66.7%	4	100.0%	0	0.0%
Flip charts	70	46.7%	80	53.3%	4	100.0%	0	0.0%
TV/Videos		0.0%	150	100.0%	4	100.0%	0	0.0%
Audio CD	60	40.0%	90	60.0%	3	75.0%	1	25.0%
Radios	0	0.0%	150	100.0%	0	0.0%	4	100.0%
Pianos/Keyboards	60	40.0%	90	60.0%	4	100.0%	0	0.0%
Recorder	70	46.7%	80	53.3%	4	100.0%	0	0.0%
Local resources	150	100.0%		0.0%	4	100.0%	0	0.0%
Smartphone/mobile phones	130	28.9%	320	71.1%	4	100.0%	0	0.0%

From the findings, chalkboards (100%) and local resources (100%) were found to be universally available for use in the teaching and learning of music as reported by both student-teachers and music tutors. However, radios were found to be unavailable with all the music tutors and student-teachers (100%) indicating that they were not available. According to the student-teachers, flip charts (46.7%), audio CDs (40%), music recorders (46.7%) and keyboards (40%) were significantly available in their colleges for teaching and learning of music. This view was supported by tutors who unanimously (100%) agreed that flip charts, audio CDs, music recorders, pianos and keyboards were available for use in the teaching of Music subject. The

study also found that overhead projectors (33.3%) and computers/laptops (33.3%), according to student-teachers, were moderately available for use in learning of music. Similarly, only half of the tutors agreed that overhead projectors were available. As for videos all the student-teachers (100%) considered them to be unavailable for their use while all the tutors (100%) considered them to be available. This shows that TV/Videos are available but only accessible to the tutors, and thus, are not used in the teaching of Music. Thus overall, the study found that chalkboards, local resources, flip charts, audio CDs (40%), music recorders and keyboards were sufficiently available for use in the teaching and learning of music.

Level of Usage of the Available Technology in PTE

The third research objective investigated the level of usage of the available technology in primary teacher education. The student-teachers unanimously agreed (100%) that some of the available technologies were frequently used while others (100%) were only used. None of the student-teachers who participated in the study indicated that the available technologies were never used. This view was also shared by the music tutors who unanimously agreed that the available technologies were frequently (primarily) (4 out of 4) and secondarily used (4 out of 4). The most commonly used technology in music education was keyboard as reported by all the respondents (150 student-teachers and 4 music tutors). The tutors also noted that technology such as chalkboard; pianos and local resources were frequently used. This underlines the significance of keyboards in music education.

Challenges to Using Technology in Music Teaching and Learning in Primary School Teacher Education

In the fourth objective, the study sought to establish the challenges or barriers to using technology. The respondents were asked to indicate whether there were challenges affecting their use of technology in the learning of music or not. Thus, the tutors and student-teachers gave their opinions which were analysed and summarised into frequency and percentages as presented in table 3.

Table 3: Challenges or barriers to use of technology in music education

Challenge/ Barrier	Student-teachers				Tutors			
	YES F	%	NO F	%	YES F	%	NO F	%
Funding for hardware	90	60.0%	60	40.0%	4	100.0%	0	0.0%
Providing access for all students	150	100.0%	0	0.0%	4	100.0%	0	0.0%
Technical issues	80	53.3%	70	46.7%	4	100.0%	0	0.0%
Lack of enough time to prepare	140	93.3%	10	6.7%	0	0.0%	4	100.0%
Training to use technology	140	93.3%	10	6.7%	2	50.0%	2	50.0%

Administrative support	130	86.7%	20	13.3%	4	100.0%	0	0.0%
Personal interest in instructional technology	30	20.0%	120	80.0%	2	50.0%	2	50.0%
Lack of workshop and seminars	140	93.3%	10	6.7%	4	100.0%	0	0.0%
Keeping abreast of new technologies	130	86.7%	20	13.3%	0	0.0%	4	100.0%
Electricity sometimes off/not available	120	80.0%	30	20.0%	4	100.0%	0	0.0%
Students can become too reliant on technology	50	33.3%	100	66.7%	0	0.0%	4	100.0%
Problems with access to hardware	90	60.0%	60	40.0%	4	100.0%	0	0.0%

The study found that providing access to all students was a major challenge as indicated by all the respondents (100% for student-teachers and tutors). Further, it emerged that administrative support was also a significant challenge as reported by majority of the student-teachers (86.7%) and all the tutors (100%). Similarly, lack of workshops and seminars (93.3% for student-teachers) and electricity not being available sometimes (80% for student-teachers) were found to significantly affect the use of technology as supported by all the tutors (100%). Based on the views of the Music tutors, funding for hardware (100%), technical issues (100%) and problems with access to hardware (100%) were significant challenges to use of technology in music education as indicated by all the tutors. However, the student-teachers did not see these as major problems with only 60% indicating funding for hardware, 53.3% technical issues and 60% problems with access to hardware as barriers to use of technology in learning of music. The study also found conflicting views from student-teachers and music tutors regarding other challenges. Particularly, whereas student-teachers agreed that lack of enough time to prepare for the music sessions (93.3%) was a challenge in using technology in learning music, the tutors unanimously disagree (100%) that lack of enough time to prepare hinders them from using technology in teaching of music. Similarly, student-teachers agreed that keeping abreast with new technologies (86.7%) is a challenge in the use of technology in music education, a view that was unanimously disputed (100%) by tutors. Over-reliance on technology was found not to be a challenge as reported by both student-teachers (66.7%) and music tutors (100%) who disagreed that students can become too reliant on technology.

Possible Solutions to the Challenges Faced on the Use of Technology

In the fourth objective, the researcher sought to explore possible solutions to the challenges faced on the use of technology in primary school teacher education. The opinion was given word for word by both student-teachers and tutors. The student-teachers and tutors unanimously agreed that funding for purchase of the equipment should be provided as well as administrative support to ensure availability of the technology for use. This emerged as indicated by one of the student-teachers who said that:

The school administration should provide support and avail funds for purchase of adequate number of equipment to be used in setting up a modern Music lab. This will ensure that students can efficiently and sufficiently access the equipment in the course of their learning. [Student-teacher 47: 12th July, 2018]

A similar opinion was also presented by the Music tutors who perceive funding and administrative support a challenge in their use of technology where one of them said that:

Providing adequate funds will enable the colleges to acquire modern technology and equipment relevant for learning the subject. This is only possible through a committed administrative support which seeks information on the need, suitability and availability of technology for use in learning Music. [Interview Tutor 2: 14th July 2018]

Similarly, Mills and Murray (2000) underscore that buying, installing and training of teachers is essential for the introduction and effective use of technology in music teacher education.

Further, the student-teachers reported that there should be training to facilitate effective and efficient use of technologies and training on the use of available technologies. This, they indicated should be done through seminars and workshops on Music and technology.

One of the student-teachers had this to say regarding training:

There is need to offer tailored training to facilitators and tutors on the available technology and their use in the teaching of Music. Moreover, orientation and training should be given to music student-teachers on the use of technology. This will boost the confidence among tutors and the student-teachers to embrace technology in routine teaching and learning of the subject. Regular seminars and workshops on Music and technology will popularise the use of technology in primary teacher education. [Student-teacher 21: 12th July, 2018].

The study found out that electricity is a requirement for operation of some technological equipment in the learning of Music in primary teacher education colleges. However, availability of electricity in some areas limited the use of such technology. Thus, the student-teachers indicated that there is need to provide electricity in some areas.

4. DISCUSSIONS

Available Technology for Use in Primary School Music Teacher Education

The study found that chalkboards and local resources were adequately available for use in the teaching and learning of music although radios were found to be unavailable. Similarly, Kadzera (2006) found that the teacher training colleges focused mainly on five instructional technologies; chalkboard, flip charts, overhead projectors, video and computers. This is supported by the findings of this present study which established chalkboard and local resources as the commonly used technology. The study also found that flip charts, audio CDs, music recorders and keyboards were adequate in their colleges for teaching and learning of music. The findings are in agreement with those of Zhao (2003) that simpler technologies requiring little adjustment to existing practices were more frequently used in teaching and learning. The most frequently used technologies in the teacher training colleges for music learning were; telephones, e-mails, overhead projectors, and computers. This shows that some aspects of technology are available for use in the colleges for music learning.

On overhead projectors and computers, these were found to be inadequately available for use in learning of music. Concurrent to these findings, Berger (1993) noted that a combination of technology with traditional methods adds a new and exciting dimension to a music-learning environment, wherein students can meet music standards as well as technology standards. Further, Berger (1993) observed that instructional use of computer technology, for example augment traditional teaching techniques to supporting entirely new modes of learning. This finding was corroborated by the interviews from the music tutors who observed that:

In the institution, there is only one projector and a computer that we can use in the teaching of Music. This is limited since there are many classes and many sessions which require the use of projectors and computers. Additionally, student-teachers cannot be able to adequately access these items due to the large number of the student-teachers hence need for more projectors and computers in the teacher training colleges. [Interview Tutor 2: 15th July, 2018].

It was also found that music videos are not accessible to student-teachers and thus, are not used in the teaching of Music. Thus overall, the study found that chalkboards, local resources, flip charts, audio CDs, recorders and keyboards were sufficiently available for use in the teaching and learning of Music. The findings are in tandem with those of Cuban (1986) who observed that overtime, schools have modified their approach to teaching as well as the methods that are used to enhance student learning. Chalk and slate were once the newest technology which is gradually changing with time. This shows that some important technology like music videos, overhead projects and computers are not adequately available which affects their use in the teaching and learning of music in colleges.

Level of Usage of the Available Technology in PTE

The finding shows that, the teacher training colleges were making use of the available technologies in the teaching and learning of Music. This was done only occasionally due to usual

unavailability attributed to financial constraints encountered in acquiring and maintaining the technology as reported by both student-teachers and Music tutors. Consistent with these findings, Mumtaz (2000) found that unavailability of technology was a key factor in inhibiting teachers from using technology in their instructions. On a similar note, Darling-Hammond et al. (2020) revealed that the two most difficult factors affecting technology use in teaching were lack of sufficient time to prepare technology-rich lessons and lack of adequate resources. This shows that despite some technologies being available in the colleges, their use is not maximised due to challenges of adaptability, electrical and convenience. To achieve regular use, the student-teachers noted that ensuring availability of funds to purchase relevant instruments, training teachers of the subject on how to use technology and building Music workshops would facilitate increased use of technology in the learning of Music. To highlight this finding, Montrieux et al. (2015) asserted that the use of technology is central to teacher education programs, since it aids in preparing future teachers to be technology-integrated professionals in the classroom.

Challenges in Using Technology in Music Education

The study found that providing access to technology for all students was a major challenge as indicated by all the respondents as well as lack of administrative support, lack of workshops and seminars and persistent power blackout. The other challenges were inadequate funding for hardware, technical issues and access to hardware by tutors. Similar findings contradict those reported by NetDay (2001) who revealed that 94% of teachers indicated that they were comfortable using computers and the Internet. This is not the case as most tutors find difficulty in using the technology. The government should provide enough funds to purchase sufficient and effective music equipment, supply electricity to all PPTCs and provide seminars and training workshops for music tutors in order to curb available challenges.

5. CONCLUSIONS

The study concludes that chalkboards, local resources, flip charts, audio CDs, recorders and keyboards were sufficiently available for use in the teaching and learning of music. The teacher training colleges are making use of the available technology in the teaching and learning of music with piano and keyboard being the most significant although financial constraints hamper acquisition, maintenance and use of technology. The study concludes that there are many challenges in the adoption and use of technology in the teaching and learning of music in teacher training colleges. The challenges identified include accessibility of technology by tutors and students, electricity to power some of the available technology and administrative support in training and acquisition of the respective technologies.

6. RECOMMENDATIONS

Based on the study findings, the following recommendations are made for policy and practice in the use of technology in the learning and teaching of music.

- i. Since the study found that there was inadequate funding for acquisition of technology, Teacher training colleges should set aside adequate funds for purchase of required equipment as well as providing sufficient administrative support to ensure availability of the technology for use.

- ii. The study established inadequacy among teachers to be able to use some technologies; thus, the ministry of education should organize training seminars for music tutors on the available technology and use of such technologies to facilitate uptake of technology in the teaching and learning of music.
- iii. Persistent power blackouts should be mitigated by the college administrators through adequate planning of music theatres to facilitate electricity access points for use with the available technology.

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Conflicts of interests

The researchers do not have any conflicts of interests whatsoever.

Data Availability Statement

All the data used in the study is within this manuscript and any supplementary sheets attached.

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APPENDICES

Appendix 1: Questionnaire for Student-Teachers

I am a postgraduate student at the Technical University of Kenya pursuing Masters of Music in Music Education in the School of Creative Arts and Technologies, Department of Music and Performing Arts. The purpose of this questionnaire is to enable me to evaluate the use of technology in primary school music teacher education in selected institutions in Kenya.

You are encouraged to answer all the questions with honest because your responses are very important to the study. Your answers will be treated with confidentiality and used only for the objectives of this study. However, the results of the study will be aggregated and published as a masters' thesis and may be shared with the public. Do not write your name or sign on the questionnaire.

Thank you very much for accepting to participate in this study.

Sambu Alice (Sr)