

TECHNOLOGICAL INNOVATION IN VOCATIONAL EDUCATION THE MATERIAL OF MUSIC AND SOUND

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Abstract

The thrust of the paper is the imperativeness of developing homegrown innovative skills to improve productivity in vocational education in Africa. The paper identified a problem that there is a dearth of innovative reading, thinking and creative acumen in the vocational subjects, such as music, dance, drama and visual arts. The paper postulates that these three factors are statistically significant predictors of proficiency in vocational education. A better understanding of the processes underlying deep creative comprehension can generate approaches to instruction that should be able to address the innovative and cognitive challenges facing the students. A need for professional support is imperious. Institutions should provide staff vast in technological and curricular resources, and create environment that can generate innovative thinking, teaching and learning. Robust infrastructure is also required in order to transform the lives of the students and provide adequate connectivity at school and at home. It's imperative to disrupt the traditional educational model to create true personalized learning for all students as we challenge the status quo. Functional model is use to evaluate the effectiveness, towards solving the problems of quality assurance in production and marketing. Programme review, experimentation and focus group discussions are used to collect relevant information. The paper concludes on the need to explore the unlimited opportunities of software to enrich creativity; learn how to perform numerous task in a computer-based environment; and need for short-term programme on modular bases on sound reinforcement, studio automation, software development and how all these can boost production quality.

Introduction

The material of music and sound production and engineering is used to discuss the vocational education stipulated in this paper. Music, as a performing art, is a type of vocational skill, created and performed in front of an audience. It differs from other vocational subject in creative arts, such as painting or graphics, in which artists create works and display or publish them. It also differs from literary arts, in which researches are conducted and findings are published in journals and books. Performing art is a multimedia theatrical production, in which the performance itself is more important than any narrative or specific message being conveyed. The artistes are not only creating different media – poetry, dance, music, theater, film, graphic art, mime, etc., they perform the created works before audience. The style of presentation is usually fragmentary and allusive rather than narrative in a series of images. Music composers need musicians to interpret and perform their works, just as playwrights need actors to perform their plays. Thus, most musical performances are really partnerships between composers and performers.

The innovative music technology programme that is being advocated in this paper, in content, includes *Instrument technology*, i.e. tuning, designing, fabricating and constructing musical instruments; *Sound engineering*, for generating tones, recording musical sound, editing and mixing of sound. It also includes; *computer music technology*, for teaching performance techniques, sampling of tones, mixing, notating etc.; using various music software for learning and production; *electronics*, for playback, cutting master tapes, mass dubbing and editing (Adéléké, 2000). The hallmark of its inclusiveness is entrepreneurial

development in the lives of those who go through the system procedures contained in its modular approach to learning. The advocated content is chatted later in this paper. Therefore the objective of the paper include the following:

- The paper advocates a learning process that can produce music technologists and technicians for the public and private enterprises
- It also advocates the introduction of innovative attitude to music teaching/learning, such as computer music technology, electronics, acoustics.
- It advocates procedures that can prepare graduates for opportunities leading to self-employment (entrepreneurship).

Personal experience of the writer as a music technology lecturer at the Polytechnic, Ibadan for close to three decades is the impetus for conceiving this topic. In those years, parents and guardians of students have made frantic efforts to discourage their wards from taking music as a career subject. What could be the possible reason for the sharp reaction? Part of the reasons are cultural – it sounds naïve to people that someone could gain admission to the university, only to come and study music! But much more that cultural reason, people consider the end-result of the training: could they develop a worthwhile career in music related vocation? In the last sixteen years we have experimented with some Technological innovations, and the students' population had grown from 80 students to over 500 students. Therefore, the thrust of the paper are threefold:

1. Using modern technology for more productivity and exploring such endeavors as art and science to develop marketable product in the material of music across the globe.
2. Discussing the imperativeness of developing homegrown innovative skills to improve productivity in vocational education in Africa, more specifically, the material of music and sound.
3. Addressing the dearth of innovative reading, thinking and creative acumen in the vocational subjects; music, dance, drama and visual arts in particular.

Training as academic musicians in the universities and Polytechnics is naïve to so

many people in Nigeria, most especially those who believe that the training process should not be as formal. This view is borne out of African traditional method of training artiste and musicians. A would-be artiste registers his interest as early as possible by following the master to perform. He is expected to learn by rote and imitation. In most cases, the trainer is within the family circle. Natural talent and ability for self-development are very pertinent to his proficiency. Nketia (1979) articulates on the semi-formal approach in the training of African musicians when he observes that traditional instruction is not generally organized on a formal institutional basis; for it is believed that natural endowment and a person's ability to develop on his own are essentially what is needed.

The technical complexities of the notation system always intimidate the lay mind (Grove, 1980). The principle of sound organization, pitch system, rhythmic figuration and

expression signs and symbols appear to be too complex when they are put on paper. It is observed among the students of secondary education in Nigeria that except for the privilege few, majority of the people find it too strenuous to subject themselves to the theoretical and harmonic rules that characterize academic music (Adélékè, 1999). Therefore, they stay off the career and unwarrantedly advance ethical reasons for not being able to cope. Unethical comparison is the spontaneous reactions of people, which are born of the fact the attitude of the traditional as well as popular musicians towards the societal norms, values and ethical standard. A good number of them are drug abuse, tout, homosexuals etc. People who are oblivious of what academic music is all about tend to compare the negative behavioral traits of the popular musicians with those who offer to study music in schools. Such expressions as ‘do you also want to become a tout or a rogue’ intimidate the would-be academic musicians (Adélékè, 1999)

Career is a long-term or lifelong job, activity, vocation, occupation, profession, calling, livelihood and line of business. In other words, career is a chosen profession that lasts a person’s working life. It can be made in any field of human endeavor, such as science, agriculture, sports, etc. (Encarta Premium Suite, 2005). The paper discusses a career in an aspect of musical study. Technology is the application of scientific theories and principles (i.e. applied mechanics, applied electricity, applied magnetism and applied acoustics etc.) to solving numerous human problems (Bame, 1989). Modern technology has made it easier for people to be more productive and to explore such endeavors as art and science without having to worry about simple survival. In context of this paper, music technology is an integral aspect of musical studies. Its content includes *Instrument technology*, i.e. tuning, designing, fabricating and constructing musical instruments for use during musical performances. Another aspect of it is *sound engineering*, for generating tones, recording musical sound, editing and mixing of sound. It also includes *computer music technology*, for teaching performance techniques, sampling of tones, mixing, notating etc., using various music software. Last but not the list is *electronics*, for playback, cutting master tapes, mass dubbing and editing (Adélékè, 2000). Putting it succinctly therefore, music technology is the science of industrial arts as related to musical sound: its production, engineering and transmission. It is any form of scientific innovation that helps a musician to create and reproduce music with the aid of electronic instruments, such as synthesizers, computer set, sequencers, samplers etc.

There are some core areas in the study of music technology that should be made available to the students as the subject areas of the programme. These areas include music

theory and composition, music therapy, music business operation and management, sound recording and engineering, sound system and electronics, technical design and drawing, material science, acoustic principles and tone production and musical instrument technology. The assumption is that students of music technology will carefully be exposed to all these cardinal study areas that may guide them into choosing a worthwhile career in sound related vocation. Students are expected to consider their natural endowment, availability of the training facilities for the acquisition of the required skill, competent personnel to teach the courses and job opportunities in the labour market, before they can specialize on a particular area.

The objective of music technology education in Nigeria could be summarized into three: one, it aims at producing music technologists and technicians for the public and private enterprises in Nigeria: who can design, repair, maintain, and fabricate musical instruments, with a working knowledge of acoustic consideration and science material. Two, the programme aims at producing graduates who can introduce innovations into Nigerian music industry, using their knowledge of computer music technology, electronics, acoustics and preparing them for professions in the practice of music technology at various levels of education and other avenues of private and public music use and entertainment (NBTE, 1992, 1998, 2006). Three, it aims at preparing the graduates for a large number of professional opportunities in the field of music in order to encourage self-employment. We can observe from the foregoing that the objectives of music technology education in Nigeria go beyond mere academic exercise, its orientations lean heavily on vocational skill acquisition for personal job creation, sustainable employment and small and medium scales industrial development.

The paper explores functional model to evaluate a curriculum in music technology that has been experimented in Nigeria for fifteen years and has produced several scores of diplomats. Effort is geared towards making the study of music technology functional in Nigeria, so that it could proffer solutions to the lingering problems of sanity in the production and marketing of music in Nigeria. The methodology employed includes observation as one of the key factors in the formulation of the curriculum and users of the same programme; critique; Focus Group Discussion (FGD) among the clusters of different stakeholders, such as, recording engineers and music scholars.

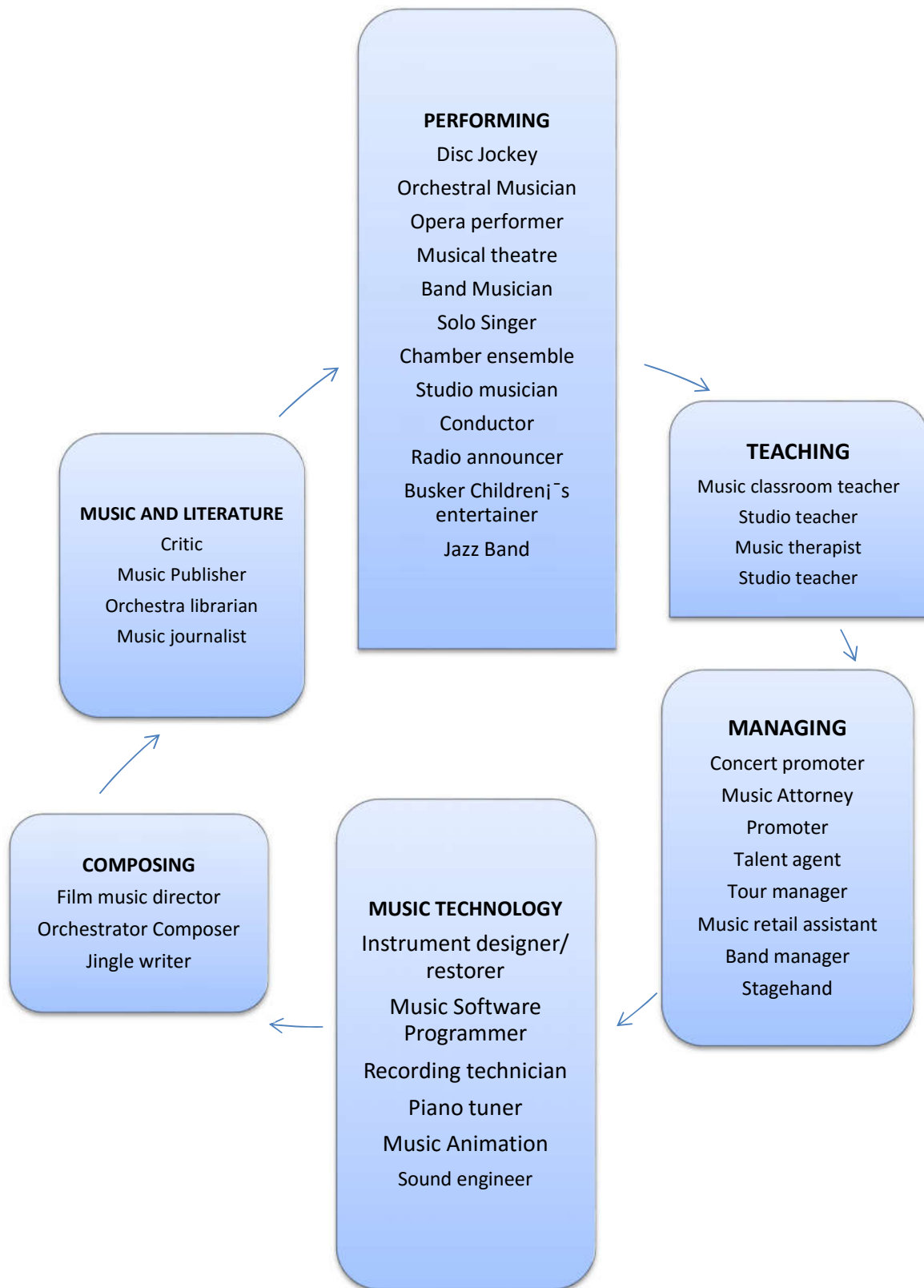
Innovative Curriculum Development

Three professional areas are identified and mentioned in this paper, as gleaned from the curriculum for music technology education in Nigeria. One, the creative areas in music are expected to lead to composing, recording and transmitting music at different socio-cultural occasions and for specific purposes. This may include composing music (vocal and instrumental), orchestration, song writing, record production, jingles and commercials, film music, music ensembles (vocal and instrumental). Courses like tonal harmony, history of music, counterpoint, form and analysis, instrumentation, orchestration, electronic music, sequencing, etc. can give a broad-base understanding to the interested candidate of music creativity. Two, the study areas in music business courses should include introduction to music business, general business and accounting courses, music merchandising, mass

communication, retail music store operation, advertising and copy writing, copyright law and legal aspects of the business of music, radio and television courses, theater arts management, concert promotion, music printing, editing, engraving, recording studio and publishing. Servicing courses from general studies, marketing and business studies and music retail operation can facilitate the candidate's firm grasp of the related subject area. The third technical areas may include computer music technology, acoustics of music (frequencies, vibrations, echo, resonance, etc.), material science, sound engineering, editing, technical drawing, tuning of musical instruments, repairs of instruments, construction of instruments, harmonic principles and so forth. In most cases, all the aspects of the technical courses are contained in the curriculum of Music Technology and they are the most needed in Nigeria music industries. The intriguing focus of this paper is marketable product orientation, as a by-product of skill acquisition in music technology education, with particular attention on how the product will satisfy the need and want of the populace and how the operators could be motivated to satisfy the market needs, through appropriate research works, product design, development and documentation, promotion, enlightenment and market variables.

Skill Acquisition Orientation

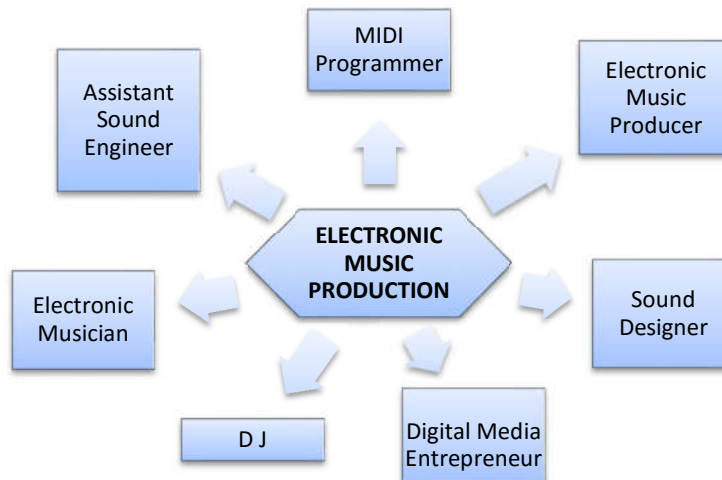
There are some core areas in the study of music technology that should be made to develop skills and facilitate professional and technical progression, that will enable people to be self-reliant, self-employed and productive in music related vocation and entrepreneurship study. These areas include music theory and composition, music therapy, music business operation and management, sound recording and engineering, sound system and electronics, technical design and drawing, material science and woodwork technology, acoustic principles and public address system and musical instrument technology. The assumption is that students of music technology will carefully be exposed to all these cardinal study areas that may guide them into choosing a worthwhile career in music and music technology. Students are expected to consider their natural endowment, availability of the training facilities for the acquisition of the required skill, competent personnel to teach the courses and job opportunities in Nigeria labour market, before they can specialize on a particular area. In what follows, skill acquisition orientation and path to developing professional competence in the material of music and sound are drawn. In a schematic map 1 below, the six cardinal areas that are used to develop the procedure are presented: Music Performance, music and literature (Journalism), music teaching and training, managing music products, composing music/ music writing, and music technology.



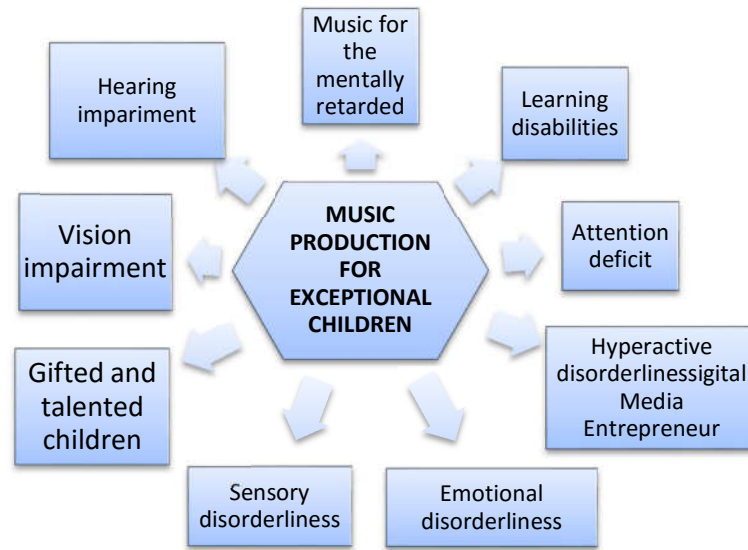
Schematic map 2: If sound engineering is chosen, some of the areas that skills and professionalism could be developed to a worthwhile career is charted as follows; and such procedure should be made available to the diplomats of music technology in Nigeria



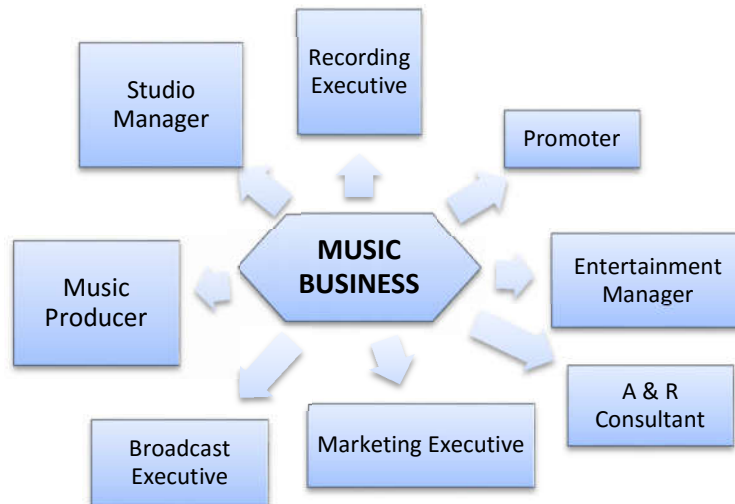
Schematic map 3: In electronic music production, the skill-based knowledge is charted, especially for entrepreneurship in sound and electronics



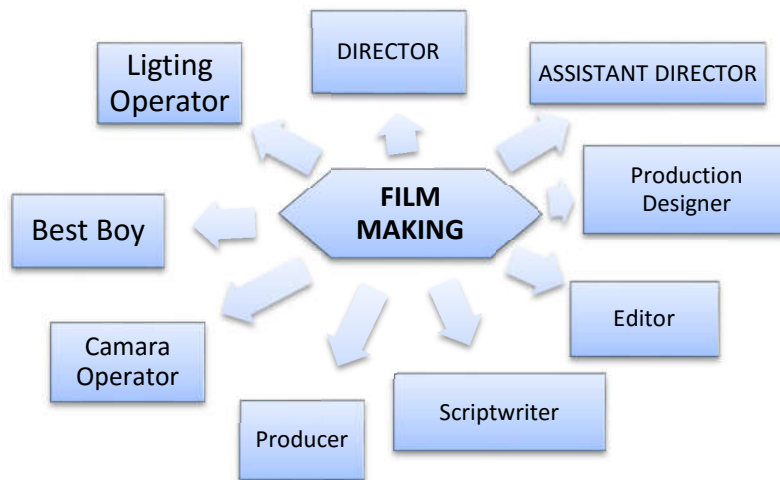
Schematic map 4: In music production for special / exceptional people, the skill-based knowledge is charted, especially for exceptional children in schools and clinical environment



Schematic map 5: In music business operation, the skill-based knowledge is chatted, especially the management of business operations in Nigeria.



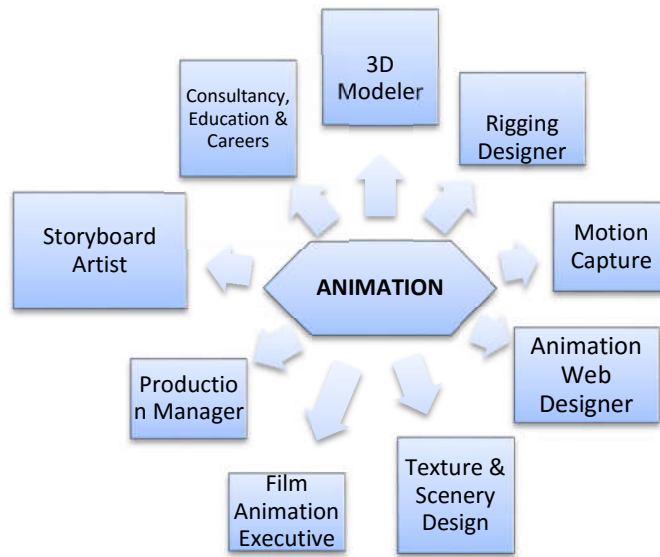
Schematic map 6: In film making and music, the skill-based knowledge is chatted, especially film music in entertainment industry



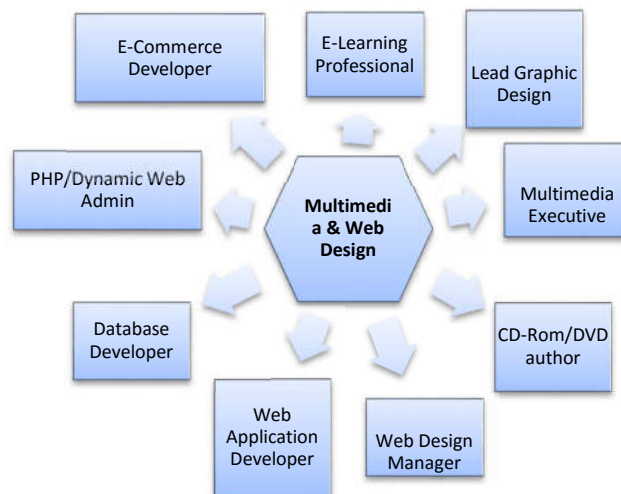
Schematic map 7: In digital music and journalism, the skill-based knowledge is chatted as follows, especially digital technology and its copious effects on the material of music and entertainment industry



Schematic map 8: In the material of music and animation, the skill-based knowledge is chatted as follows, especially the nexus between music and other form of kiddies entertainment



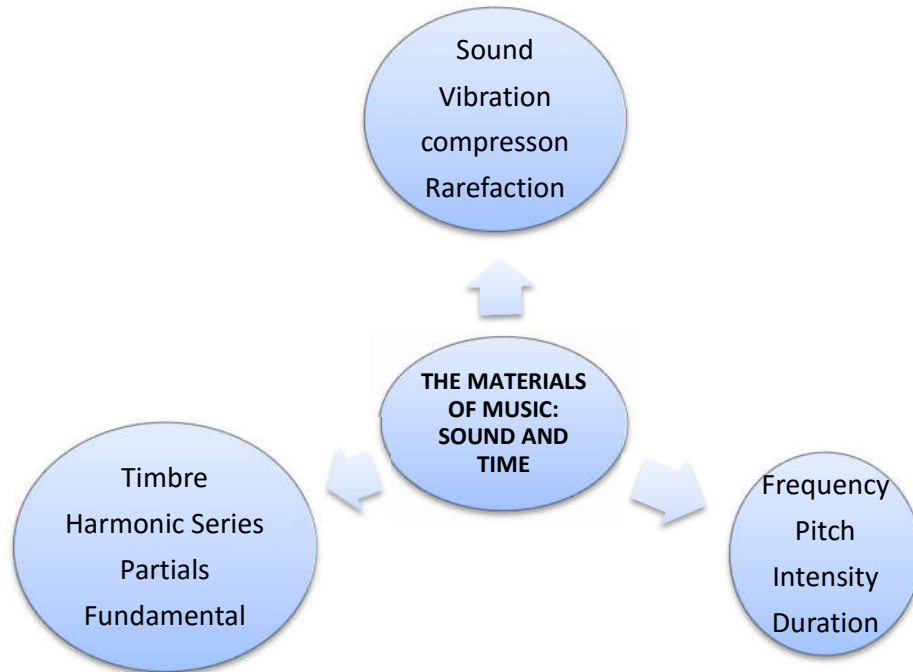
Schematic map 9: In multimedia and web design, the skill-based knowledge is charted as follows, especially the audio engineering, multi-media projector and Webcology



The Materials of Music

The material of music and sound is a performing activity in timing and counting for a mind that is more conscious of the performance than the mathematical sense of counting. The difference between the sound of music and noise making is the time factor. Definite time is followed when musical sound is on; whereas, the sound that is produced in noise is not guarded by any frame work of regular timing. The basic characteristics of musical tone, which include pitch, duration, intensity and timbre, are the fundamental elements of sound. Sound is the sensation perceived by the organs of hearing when vibrations (sound waves) reach the ear. Vibration is the periodic motion of a substance. When a musical instrument is played, the body of the instrument and the air inside and around the instrument vibrate at a given frequency, depending on the velocity of the playing. One complete cycle of compression and rarefaction produces a vibration or sound wave. Frequency refers to the number of compression or rarefaction cycles that occur per unit of time, usually one second.

The physical characteristics of music involve principles of acoustics, physics, mathematics and engineering. The scientific aspects of music include interest in specification of stereo components in electronics, sound reinforcement of recording studios and music concerts, computer-generated music and acoustic design of concert halls. Acoustics is the science of sound and the physical basis of music. It is applied to the construction of musical instruments, audio equipment, construction of music auditorium, recording studios, etc. The basic materials of music are sound and time. When you play an instrument or sing, you are producing sounds, so it is important that you thoroughly understand these basic materials. Sounds are used to structure time in music. Time occurs in the duration of sounds and silences in-between sounds. Our discussion here is devoted to a study of the complex relationship between these two basic materials: sound and time. A vivid example of the interrelationship between Music, Sound and Time is illustrated in schematic map 10 as follows; indicating various aspects of acoustic materials of musical sound.



A tone produced by the regular vibrations of an elastic material. The vibrations, or back-and-forth movements, set up vibrations in the air (sound waves), which in turn make the human eardrum (a thin, elastic membrane inside the ear) vibrate and cause the tone to be heard. In musical instruments, sound is produced in one of four principal ways: (1) a tightly stretched string or wire is set in motion by a bow (violin), by plucking (guitar, harp, harpsichord), or by hammers (dulcimer, piano); (2) a column of air inside a tube or pipe is set in motion, either by one or more reeds activated by air pressure (organ, oboe, clarinet) or by the lips (brass instruments); (3) a tightly stretched membrane or skin is set in motion by a beater (drum) or by the vocal chords (voice); (4) a solid body is set in motion by striking, rubbing, or other contact (xylophone, triangle, bell). In some instruments, electric impulses create vibrations that correspond to those of musical tones. The difference between musical tones and noise depends on the nature of the vibration. A musical tone has a regular number of vibrations per second, called its frequency. Frequency is measured in cycles per second, or Hertz, each cycle representing one complete back-and-forth movement. Noise has no regular number of vibrations per second. However, with the introduction of electronic music, the definition of what constitutes musical sounds has been greatly expanded.

Vocational inclinations

The study areas are designed to adequately prepare trainees to braze up for the challenges in the nation's music industry. It is important to note that the broader the background and training of a would-be music technologist, the more industry jobs the person will be able to undertake, the narrower the background, the narrower the opportunities. Four professional areas are identified in this paper and are briefly discussed as follows:

1. Creative Areas

Creative areas in music are expected to lead to composing, recording and transmitting music at different socio-cultural occasions and for specific purposes. This may include composing music (vocal and instrumental), orchestration, song writing, record production, jingles and commercials, film music, music ensembles (vocal and instrumental). Courses like tonal harmony, history of music, counterpoint, form and analysis, instrumentation, orchestration, electronic music, sequencing, etc. can give a broad-base understanding to the interested candidate of music creativity.

2. General Musicianship

In most cases, general music courses are expected to lead to teaching music in schools and conservatories, performing music in clubs and ceremonies, writing articles on music inside the dailies and magazines, preparing review to music albums and directing music in movies and cinematography. Intending students will need any of the following courses: music theory and history, studies in popular genres such as Highlife, Juju, Fuji, Hip pop etc. It will also include studies in music criticism, curriculum development and review, musical practice in people's culture and, Nigerian music, Black American music, music therapy, music education and private music teaching, music Library (music bibliography and historiography), Asian and Middle-Eastern music, music and the technical media, music technology. All these will broaden the scope of learning of the student and it will enhance a better grasp of the subject.

3. Music business courses

The study areas in music business courses should include Introduction to Music business, general business and accounting courses, music merchandising, mass communication, retail music store operation, advertising and copy writing, copyright law and legal aspects of the business of music, radio and television courses, theater arts management, concert promotion, music printing, editing, engraving, recording studio and publishing. Servicing courses from general studies, marketing and business studies and music retail operation will facilitate the candidate's firm grasp of the related subject area.

4. Technical courses

From Grove's Dictionary of Music and Musicians (1980), it was observed that the most intimidating aspects of musical study (most especially to the trainees) are the technical courses. Some of these technical courses include computer music technology, acoustics of music (frequencies, vibrations, echo, resonance, etc.), material science, sound engineering, editing, technical drawing, tuning of musical instruments, repairs of instruments, construction of instruments, harmonic principles and so forth. In most cases, all the aspects of the technical courses are contained in the curriculum of Music Technology and they are the most needed in Nigeria music industries.

Innovative Career Path

Creating music is often described as a universal phenomenon as part and parcel of peoples' expression of their arts in culture. This is especially true to any of the African community where there is the concept of communal ownership of musical tradition. However, training in music in the present Nigerian situation should go beyond the usual apprenticeship that was intrinsic to African tradition. A systematic study of music in a more formal setting, such as schools should be encouraged at all levels of educational system; this, of course, must be career inclined. The writer identified and traces the societal ill feelings towards musical studies in school to inability of the trainers to define career path to the trainees in particular and the teeming population in general. The sharp reaction of people against musical studies goes beyond technical complexity as observed by Grove's Dictionary of music and musicians. It also goes beyond unethical comparison as identified by Adéléké (1997). It is more of the feasibility of earning a living through it after the training. If this is fail-safe, more people will come into the line of work. In what follows, some of the careers paths created around musical study to provide enough encouragements for whoever wants to take the course are itemized and briefly discussed.

1. Resident artistes

By their training, resident artists are supposed to direct or produce music as studio engineers, pop singers, church musicians, theatrical musicians, nightclub singers, and folk instrumentalists. They can also plan and present music programmes on radios, perform at ceremonies, and worship centres. In most cases, they demonstrate high proficiencies in singing and/or playing of one particular musical instrument or the other.

2. Music composers and song writers

By the virtue of their training, music composers are expected to write or arrange songs for play band, film, choir, television, radio and for specific groups of performers. Theory of music, tonal harmony, counterpoint, and studies in orchestration are the working tools of musicians in this category.

3. Music educators

Music educators are teachers who engage in private or public teaching of music as home lessons, at studios, schools, colleges and universities. They are responsible for the writing of curriculum for the subject, teach it and examine the students from time to time. They are also responsible for carrying out government policies as related to music as a school subject. They are expected to be versed in theory and other aspects of musical studies that we enable them to impart the knowledge to their students. They should also be able to play and train their students to perform on the piano and other music l instruments.

4. Directors and Producers of Music

Music directors and producers plan and present music programmes on radio and television stations; they work as programme assistant as well as controller of music programme in media centres; they raise choral and orchestral groups for corporate organizations. They are expected to be versed in theory and other aspects of musical studies, such as history, musical styles, orchestration, journalism, regional music as well as music and social ethics.

5. Concert promoters:

Concert promoters organize, plan and promote music related shows e.g. musical concerts, festival, jamborees for groups and individuals and take a percentage of the proceeds as their remunerations. They make publicity and advertisement of festival music. Generally speaking, concert promotion and music fiesta are their jobs and they earn a living through it. They are expected to be inclined towards music business operations and entrepreneurship as related to music, apart from the required general musicianship

6. Music critics and journalist

In most cases, music critics and journalists are newspaper columnists and magazine subscribers. They write critical reports and reviews on concerts, records, video and audiotapes produced by artistes. They also write review on live shows, film production, for newspapers, magazines, journals and periodicals. They work as music librarians, archivists, music biographers at schools, radio and television stations, as well as museums. Their trainings are inter-twined with music and mass communication. The combination of music and mass communication strengthens their professional competence.

7. Music librarians and archivists

Music librarians and archivists work in libraries archives across the nation to keep records of musical events with print and electronic devices. They subscribe to music magazines and academic journals on related fields. They document concerts and autobiography of music

composers, performers and promoters. They are located in college libraries, schools and universities. Some of them work at radio and television stations, museums and music archives. In most cases they combine their musical training with library science to enhance professional competence at their duty posts.

8. Music business operators

Music business operation is a vast and complex industry, with diversified avenues and approaches. It includes acquisition of instruments for rental services and retail, gigging, demos, songwriting, recording, studio work, music publishing, music and video promotion, to mention a few. Some of the interested academic musicians take to retailing and wholesaling of band and orchestral instruments, keyboards, printed music scores, amplifiers, tapes, compact disc records, etc. all these and many more stem out of music business operation. Special training in music business operation and entrepreneurship is required for career competence.

9. Music therapists

Music therapists work in mental and rehabilitation hospitals, old people homes, hospitals, home for the handicap, disabled people group, to mention just a few. Music has been used in history to facilitate healing process in individuals with ailment that is particular psychological and emotion-borne. In the contemporary world, trained musicians have found specialization and career in health related music performance. Such specializations require that the would-be therapists should combine knowledge of medical sciences with their musical training in order to strengthen the effectiveness of their operations.

10. Bandsmen

Bandsmen are those who have picked-up a career in music in the armed forces, working either as instrumentalists or band directors/conductors in the police, army, navy and air force. Apart from their normal training in music, they are enrolled and made to participate in the required military training as stipulated in that profession. After they have been commissioned, they specialize in supplying music for military parade, and earn a living through it.

11. Music technologists

Music technology is a specialization in music that requires designing, fabricating, manufacturing, repairing, tuning and servicing of musical instruments. It includes recording, reproducing and dubbing of audio and video music tapes and cassettes; using music soft wares and exploring the dynamism of computer technology. Specializing in music technology require a vast training in electronics, acoustics, technical drawing, material science and general musicianship.

12. Music publishers:

Music publishing requires writings, publications and sale of written music scores and other music related articles. The original role of music publishers is to promote songs for the use by non-composers. The beneficial areas include mechanical royalties, performance of the songs live, on radio, juke boxes, television etc., film and drama synchronization, lyrics editing etc. This will require a tremendous amount of administrative work in terms of regulations, laws, rules and musical knowledge regarding song writing. The training of a music publisher includes vast knowledge of computer music technology, basic knowledge of printing and music as a career subject.

Conclusion

In order for an enviable change to occur in any facet of human endeavour, two things are inevitable: discoveries and development. The study of music technology as a programme is quite new in the country Nigeria, the present programme of NBTE experiment has helped to discover values that this seemingly new area can inject into musical study in general. The aspect of development should focus on career opportunities derivable from the field in particular. Therefore, the paper is more of a catalyst of career development in music related vocations. It has postulated that music scholars in the country should be more career-inclined as they give technical instructions to the students. They should also give more attention to the study of music technology, with sufficient emphasis on the creative and performance of music, musical instrument technology, applied electronics, computer music technology, material science, design and technical drawings. The paper concludes with emphasis on the need to explore the unlimited opportunities of software to enrich creativity; the need to learn how to perform numerous task in a computer-based environment; and the need for short-term programme on modular bases on sound reinforcement, studio automation, software development and how all these can boost production quality. If these are done, a number of things will happen: career path in music would have been better defined and thereby making it more attractive to the youths. It will help Nigerian music industry in the aspect of quality control in the area of production. More job opportunities will be created for more music graduates. It will foster a better approach to construction, repair and maintenance of musical instruments. Finally, it will create Resource Avenue for research works in areas such as general musicianship, acoustics of music and sound engineering.

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