CHALLENGES AND FUTURE OF TEXTILE TECHNOLOGY AND DESIGN EDUCATION

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Abstract

This paper examines some of the challenges encountering Textile Technology and Design programme, a specialization in Fine and Applied Arts discipline in the Nigerian Universities. It reviews the scope of the present curriculum and its limitations which include acquisition of technology. It also suggests achievable panacea for the future to include high technology orientation in all phases of textile production for the student and in-service training for the lecturers who have inadequate industrial experience so as to meet the over-increasing demands of textile technologists and designers in commerce, industry and for the economic development of the nation in the new millennium.'

Introduction

Technology has been universally accepted as the parameter for measuring the magnitude of development and political prowess of many nations. The paramountcy of technology education in a country like ours deserves a rapt attention and intensive exploration for the benefit of mankind.

Definition

Many scholars have explored multi-dimensional approaches in their individual attempts to define technology to certify diverse context and phenomenon. Jackson (1970) defines technology as a process of applying scientific principles to the achievement of defined objectives. Lexicon Webster Dictionary defines technology as the branch of knowledge that deals with the industrial arts and sciences and the utilization of that knowledge to produce the material necessities of a society. Baikie (1988) sees technology as the sum total of the ways in which a social group provides themselves with the materials of their civilization. Ojo (1986) opines that technology is the systematic application of a scientific knowledge to practical tasks in industries. Hannay and McGinn (1980) defines technology from its content as the complex of knowledge, methods and other resources used in making a particular kind of product or in creating a particular procedural system at a given time in a particular society. Adediran (2000) defines indigenous textile'" technology as a veritable application of indigenous scientific knowledge to finding solution to the problem of clothing and textile through transformation of local material resources for his benefit today in terms of comfort and security much better than yesterday.

Challenges

It is imperative on this country that Nigerian Fine and Applied Arts University graduates specializing in Textile Technology and Design should be able to conceptualize, design and fabricate various equipment and tools for textile/fabric construction and finishing. This can be through the channel of technology acquisition. According to Gomwaik (1985), acquisition of technology embraces the gaining of skill and ability to reproduce that technology in any modified form to suit any given environment or serve a specific purpose. The present situation of over - reliance and dependence on foreign expertise on production, installation and maintenance of high technology for industrial production have adverse effect and cheapened, if not degraded intellectualism of our indigenous textile technologists, designers and engineers.

Since the political independence of Nigeria, 1st October, 1960 there had been sporadic increase in the number of art schools churning out artists, designers and textile technologists year in year out. Out of the thirty-six universities (Federal, State and Private) in the country, about twenty of them are presently pursuing Fine and Applied Arts programmes under different guises as Fine Art,

Applied Arts, Industrial Art; Creative Arts e.t.c. Some of these universities are Ahmadu Bello University, Zaria; University of Nigeria, Nsukka; Obafemi Awolowo University, Ile-Ife (former University of Ife); University of Lagos, Lagos and University of Benin, Benin City which are the first generation. Others are: University of Maiduguri, Maiduguri; University of Port-Harcourt - the second generation; others are Federal University of Technology located in Akure, Yola and University of Agriculture, Abeokuta - the third generation. Others are State Universities - Ladoke Akintola University of Technology, Ogbomosho; Delta State University, Abraka; Ambrose Alii University, Ekpoma; Nnamdi Azikiwe University, Awka; Abia State University, Uturu, University of Uyo, Uyo; Anambra State University of Science and Technology, Ulli; Imo State University Owerri; Abubakar Tafawa Balewa University, Bauchi; Niger-Delta University, Wilberforce Island, Bayelsa - fourth generation. None of the private universities which form the fifth generation has established a Department of Fine and Applied Arts. Though training of the Fine and Applied Artists is not confined to universities alone, many more are trained at the Polytechnics to produce middle level manpower and art educators at the Colleges of Education level. Despite the fact that a large number of these graduates have been turned out in the last four decades, the number could not meet up with the requirement for the industries, commerce and economic development of the nation. The numerical strength is even incompatible with other professionals in the other sectors such as accounting, banking, business administration, medicine, engineering and law.

The textile technology and design education curriculum entails acquisition of skill and scientific knowledge in appropriate technology more than high technology. The scope encompasses orientation in both theoretical and practical aspects of textile technology and design. It will be quite illuminating to use some segments of textile production and the level of exposure at present in many of the universities as illustration.

Raw materials are required to be processed with the aid of certain technologies to produce fabrics either at workshop, small scale, medium scale and large scale levels. Part of the processes involve spinning, warping, weaving and finishing. Each of these processes is now discussed below with the relevant technologies being used:

Spinning: Training involves theoretical knowledge of various spinning methods and variety of raw materials like cotton, wool, silk and unlimited number of synthetic yarns. Meanwhile, commercially spun yarns are bought at retails in large quantities depending on individual's requirements based on the design concept. These are purchased in the forms of hanks or skeins, cones and cheeses, unwound and laid as warps on loom using the appropriate technologies. These include the bobbins, spools wooden creels, skein winder and jenny. The number of these equipment is limited and inadequate compared to the strength of the class where they are even available, in most cases they are not.

Warping: This is the next stage of textile production. The students are exposed to practical training on various warping methods for studio/workshop and industrial purposes. Warping techniques depends on certain factors such as design concept, the morphology of the yarn available be it natural or man-made and typology of loom. Remarkable efficiency and competency in the operation of these appropriate technologies are noticeable -warping drums of various dimensions, warping mills, wiping boards, creel, bobbins and skein winder.

Weaving: They are exposed to the basic weaving methods, various types of weaves and fabric construction on different types of looms. Studies are based on the behavioural tendencies of different types of yams, natural, man-made and blend in the weaving processes. They are trained to develop design concepts for plain, twill and satin weaves. They build patterns on point paper for loom translations. The low technologies are the traditional horizontal loom, the contemporary broadloom, the vertical loom, the inkle loom, the table loom and improvised box loom. All are locally fabricated or constructed for studio use.

Finishing: This process involves treating the fabric with certain chemicals to make it suitable for embellishment to perform certain functions or specific uses. This also includes dyeing and printing processes. Meanwhile, already factory - treated fabrics are produced in the markets on retails of

dyeing and printing processes. Many woven fabrics/weaves produced do not require dyeing but can be printed if the designers so desire. Designing, dying and printing are all manually executed. Some tools used for designing are the drawing set, ruler, tapes, French curves, brushes, for dyeing - plastic baths of various sizes, cooking pots, bowls, lines, tjanting for waxing, metal or plastic stencils, electrical stoves or kerosene stoves for printing, these equipment are employed namely - squeegee, mesh frames, the printing bed, lighting box, hand drier, fan, fluorescent tubes, bulbs, etc.

The challenges facing the training of the Fine and Applied Arts graduates that specialize in Textile Technology and Design are manifold. It is not an over statement that they require to be adequately equipped with knowledge and skill for the operations of the under mentioned modem sophisticated machineries that are constantly employed in mass production of textile materials. The stress in much more on the industrial production of fabrics from natural fibres like cotton and other closely related man-made fibres.

Spinning: This is a long series of progressive operations by which mass of cotton fibres is gradually converted into finer and stronger yarns. To high technologies namely: the bale opener, the carding machine, the drawing frame, the combing machine, the roving machine and the spinner.

Bale Opener: The machine is complex, comprising of various compartments that perform different but related functions. The machine fluffs either natural or man-made staple fibres and remove the foreign matter. The opener's major operations with its chute-feed system and merry-go-round-like units of bale pluckers and lattice are loosening, bending and cleaning of the fibre to form LAP as the end-product. Lap is later fed into the carding machine.

Carding Machine: The machine processes the lap and partially straightens the fibres and forms them into a thin web of soft rope of fibres called carded sliver. The carding machine consists of a large cylinder embedded with fine teeth or slates whose movement in opposite direction create a combing action and pull the fibres into parallel position. The rope-like strand i.e. the sliver is carried upward and automatically coiled into a tall can for storage.

Drawing Frame: It is a machine that combines many carded slivers into one drawn sliver with the aid of sets of rollers, each set running successively faster than the preceding set. Its major operation is to increase parallelisation and uniformity of fibres.

Combing Machine: The combing machine parallels, removes short fibres and forms combed sliver. It is often used when long staple fibres of cotton are to be spun. The combed sliver are more uniform in length. Drawn slivers are combed for more uniformity despite the cost of operation. As much as one - fourth of the fibres is combed out as waste.

Roving Machine: The operation of the machine is to reduce the size of the drawn sliver through the set of rollers. The roving machine increases the parallelism and inserts a small twist on the fibre to produce a roving now wound on a bobbin.

Spinning Frame: The machine is used to add twist that makes the yarn a single - spun. The roving is drafted through three sets of rollers revolving at different speeds, reducing the diameter of the roving and elongating it. The front rollers moving at faster speed than the back and the middle sets.

There are five machines for spinning yarns namely: the flyer, ring, mule cap and open - end spinner. They are so designed because of the difference in the properties and characteristics of fibres. These frames are designed for spinning natural fibres and man-date staple fibres that they most closely resemble. (Gale, 1971).

The flyer spinner is used to spin wet or dry linen, certain wool fibres, mohair and other long natural fibres, while the cap spinner is good for spinning wool fibres into worsted yarn for high productivity. Mule spinner is used for spinning wool and yarns of a very high count. Ring spinner is employed for worsted and cotton fibres after the preparation processes. Because ring spinning is a slow textile process in terms of productivity per unit produced, limitation in traveler speed, package

size and adaptability to automation, open - end spinner performs faster and can be compared with the whorlless primitive spinning. Open - end spinning frame is the latest in the spinning technology for spinning cotton, viscose or blended yarn directly from 2-3 passed slivers by using a spinning chamber with a velocity of 30,000 r.p.m as compared to the conventional spindle-ring traveler system of 15,000 r.p.m. maximum. It produces triple of the production of the other spinner. It requires less than half of the manpower of the conventional spinning and 'occupies one-third of the floor space for installation. It was exhibited at Textile fair in late 1967 by Elitex Textile Machine Company -Czechoslovakia with "BD 200" title.

Cone Winder: This is a machine that is employed to wind yarns from bobbins into core forms in preparation for assemblage, weaving or dyeing.

Assembly Machine: It is employed to combine yarns from various cones, and cheeses into bigger cheeses to be used for warping in preparation for weaving process.

Weaving Preparation

The following are essential for preparing the yarns of natural or man-made fibres for weaving operations - size is used for sizing the yams, giving them adequate strength to withstand stress that they will undergo on the loom. The yams are warped on the warping drum with the aid of the creel and other warping accessories. Reeding tools are employed for reeding or denting the yams from warp beams through the eyelets of the harnesses mounted on stands. The principle of operations of these machines is similar to that employed on appropriate technologies but different in the sense that the industrial machines are mechanical and automated. The denting operation is the only segement that is not mechanized.

Weaving

Weaving proper is carried out with the aid of a machine called loom. At the studio's level all the loom types are manual. Samples of the looms, used in training the students presently are the traditional horizontal loom, the contemporary broadloom, inkle loom, table loom and the improvised box loom. Operations of all these are basically shedding, picking and beating, other auxiliary operations are let - off, take-up and pattern. It is not all ..the institutions that can boast of all these appropriate technologies. Types of looms designated for industrial production that are also required to train the students in the institutions are Box, Plain, Dobby, Double-cylinder, jacquard, Leno or Doup and shuttleless loom. These high technologies are modern powered, automatic looms manufactured with many auxiliary mechanisms used to prevent fabric faults, ensure safety in operation and to facilitate the labour of the weavers. These mechanisms and safety devices are employed in loom classification as well e.g. weft insertion mechanism, width of fabric produced, motion design, number of shuttles used, design of safety devices for warp breakage, drive arrangement e.t.c. Automatic looms are used in the production of cotton and closely - related man-made fabrics. There is constant improvement in loom technology to facilitate productivity and efficiency.

Finishing

Woven fabric and others are subjected to certain pretreatment and after-treatment operations using specialized high technologies and chemicals for specify operations. Examples of pre-treatment and after-treatment operations are desizing, scouring, bleaching stoving, mercerization, raising, nap finish, dress face finish, shearing, singeing, crabbing, stentering, water proofing, velanizing, crease-resistance, flame-resistance, calendaring, piliing etc.

Design

Design equipment are light box, palette, brushes, drawing set and computer systems. Design concepts are developed by designers and translated manually on a ground (board) or through the computer. Textile technologists and designers are exposed to various techniques of designing and manipulation of tools.

Printing

Another segments of finishing a fabric are dyeing and printing as forms of enhancing or embellishing the quality. Students are exposed to manual dyeing techniques and never use machine dyeing. Knowledge and skills are acquired in hank dyeing but not exposed to beam and cheese/cake and cop dyeing (Gale, 1971). Modern power technologies are used in screen printing, rotary screen printing, duplex printing and transfer printing. Computer is employed in dye mixing for printing to eliminate human errors.

Training of the textile technologists and designers in the use of modern mechanical and automatic equipment and tools in textile production is very crucial to enhance the quality of instruction being imparted. According to Crawford (1963), training is that process by which individuals leam the knowledge, skills and other attitudes, not previously in their repertoires which will fit them to function as human components in a system. All segments of our technology - based economy especially textile, require regular training in the university and industry to sustain it. By the establishment of universities of technology nationwide, out of which LAUTECH, Ogbomosho: FUTA, Owem, UNAAB, Abeokuta; FUTY, Yola offer Fine and Applied Arts as disciplines and Textile Technology and Design as a specialty, pragmatism has been seen entrenched in the Nigerian university system. They should be producing not only engineers with both theoretical and practical base but science based professionals like textile technologists and designers described by Chijioke (1982). He described this calibre of professionals as Research and Development (R-& D) Engineers whose major objectives is to initiate product - oriented research.

Textile technologists should be able to fabricate simple components with local materials to build up the sophisticated machines that can be adapted for textile production. The textile designers should continue to conceptualize and create aesthetic forms for engineering, dyeing and printing purposes. Textile technologists should be able to explain the characteristics and properties of different natural and man-made fibres and textile engineering materials. They will.invent ideas, techniques and tools, through critical observations. The success of textile technology education will be measured by its contribution to the comfortable co-existence of the society and the improvement of the economy.

Conclusion And Recommendations

It is very important that the curriculum on Fine and Applied Arts and Textile Technology and Design specialization be restructured to expand the scope of knowledge and be practice-oriented. It is not an overstatement to include acquisition of high technology in the scheme of work for proper orientation. Lecturers who do not have adequate industrial experience should be sponsored to workshops on industrial activities. The present SIWES Student Industrial Working Experience programme for the Textile technologists and designers be enhanced by extension of time and offer of incentives. Nigeria will be a better place to live in if these areas and suggestions are critically looked into. Our dependence on regular importation of second and textile materials will cease. The textile industries will be boosted to produce at full capacity.

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