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Modern Building Skills Required for Self-Reliance of Students of Technical Colleges in Rivers State

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ABSTRACT

The study assessed modern building skills required for self-reliance of students of Technical Colleges in Rivers State. Four purposes, research questions and hypotheses guided the study. This study adopted a descriptive survey research design. The study was carried out in Rivers State Nigeria and had a population of 65 respondents, comprising 40 brick/block laying teachers and 25 instructors in the four Government Technical Colleges in Rivers State. The study was a census as the entire population was studied. The instrument for data collection was a structured questionnaire titled "Modern Building Skills Questionnaire". The instrument contained four sections A-D. The instrument was structured on five-point likert type rating scale of Strongly Agreed (SA), Agreed (A), Undecided (U), Disagreed (D) and Strongly Disagreed (SD). A corresponding numerical value of 5,4,3,2 and 1 was assigned to the response scale for each item as represented below with real limits. The instrument was subjected to face and content-validation by three experts in vocational and technical Education and a measurement and evaluation expert. The internal consistency of the instrument was established using test-retest reliability method. This gave a reliability coefficient of 0.68. The findings of the study revealed that the respondents agreed on the tiling skills required for self- reliance of students of Technical Colleges in Rivers State. Findings of the study also showed that the respondents also agreed on the production and installation of baluster's skills required for self- reliance of students of Technical colleges in Rivers State. The findings of the study showed that the respondents agreed on the three-Dimensional (3D) modelling skills required for self- reliance of students of Technical colleges in Rivers State. Base on the findings, conclusion was made and recommendations made amongst others include that seminars, workshops and conferences should be regularly organized for teachers and workshop attendants. Where experts in the industries will train the teachers, workshop attendants and on the current technical competencies and skills in order for them to be updated with the current trends in the production and installation of interlock concrete paver. Block-laying and concreting students should be placed on industrial training and should be strictly supervised since this will create excellent opportunities to acquire the technical competencies required for production and installation of balusters. Greater emphasis should be made on practical classes by the teachers and attendants in order to acquire the tiling and other skills required for employment.

Introduction

Technical vocational education and training is aimed at helping people to develop desirable attitudes and skills necessary for the world of work, resourcefulness and ability to adapt to life's changing situation. According to McGrath (2011), TVET is self-reliance oriented. It is a dynamic field of study whose primary purpose is based on the improvement of the lives of its recipients and the society. There is scarcity of human basic needs, hunger, inadequate shelter, etc which is as a result poverty and unemployment. Poverty is the inability to attain a minimum standard of living. The poverty level of the people in Nigeria is very high. The income level of the people is very low. There is gross instability in employment. Many people have little or no assets. They are uneducated and live in unhealthy conditions. The poor are illiterate, poor in health and have short life span (Porres, Wildemeersch & Simons, 2014). They are not self-reliant. They are handicapped or ill equipped to help themselves. As a result of these limitations, skill acquisition for self-reliance is indispensable. TVE encourages the expansion of knowledge and development of skills by every citizenry.

The philosophy of TVE is centred on the acquisition of knowledge and skills that can be applied for purposeful living. TVE as a skill-oriented programme characteristically has a lot of opportunities for small-scale businesses wherein graduates can be self-employed (Marope, Chakroun & Holmes, 2015). This is because TVE is a broad and diversified field made up of many sub-areas including: Industrial and technical education (Building Technology, Electrical technology, Mechanical technology), business education (secretarial studies education, accounting education), home economics education, agricultural education, among others. A good TVE programme ought to aim at the following: Training students for proficiency in specific occupations in the area of TVE. Making students to acquire specific skills that can make them to be self-reliant. Training

students to acquire skills on how to float and succeed in a business venture (Billet, 2011). The above aims gave rise to the establishment of technical colleges in Nigeria.

The Federal Republic of Nigeria (FRN) (2013) in the National Policy on Education (NPE) stated that technical colleges are designed to prepare individuals to acquire practical skills, basic scientific knowledge and attitudes required as craftsmen and technicians at subprofessional level. The implementation of the above stated policy objective by the Federal and State governments led to the establishment of technical colleges in nearly all the states of the federation, with the aim of ensuring that the teaming youths acquire the much needed employable skills which would prepare them to take up their appropriate roles in the technological development of the nation. Among the curses offered in technical colleges include brick/block laying and concreting.

Brick/block laying and concreting is one of the courses offered in Nigeria technical colleges. Almost all the members of the society benefit from the products of brick/block laying and concreting. Brick/block laying and concreting programme at the technical college level is designed to produce skilled builders for the building industry. Brick/block laying and concreting as a course comprises of different components or operations which require skills to perform them. These components include designing of building plans, setting out of the building, execution, block work on the concrete foundation, leveling of the building, roofing pattern, plastering and rendering of walls. These areas of operation require that students of brick/block laying and concreting should possess the necessary skills to carry them out. Brick/block laying and concreting students should possess skills in designing building plans and be able to read and interpret them. Students of brick/block laying and concreting ought to possess skills in setting out of buildings, form block walls on the concrete foundation, be able to level the building and also possess skills in designing good roofing pattern using modern building skills such as tiling.

Tiles are used to cover interior and exterior surfaces, such as the floors, walls and ceilings of homes (especially bathrooms and kitchens), commercial and office spaces and outdoor environments, such as gardens, patios, terraces and swimming pools (McIntosh, 2008). A thin covering unit of varying size and shape (e.g. squares, rectangles, diamonds), tiles may be made of a range of materials, including ceramics, brick, marble, plastic and natural and artificial stone. The first step of a new tiling job is planning. This involves inspecting the area to be tiled (assessing the surface conditions and taking measurements), defining the preparatory work that needs to be carried out, planning the tile layout, calculating the materials required (example number of tiles and amount of adhesive) and, finally, estimating the total cost of the work. The next step is execution. First, the old tiles, cement, grout and adhesive are removed and the surfaces levelled off. Adhesives and cement are then applied using a notched trowel and sponge float and the tiles are positioned in accordance with the planned layout. To install edges and corners, the tiles may need to be trimmed or cut. This is done using a handheld or benchtop tool, such as a tile cutter or wet saw. This operation requires considerable skill on the part of the tiler. After the tiles have been laid, they need to be finished. This typically involves sealing the tiles, filling the gap between them with grout and cleaning the entire tile surface. In addition to laying tiles, tilers also carry out a range of other related jobs, such as knocking down and building walls and dry linings and installing other types of wall and floor coverings, such as plaster, marble, wooden parquet flooring, carpeting and installation of balusters (Fred, 2008).

A baluster is a vertical pole or post that attaches to a rail. When used in a series, balusters form a balustrade (Frampton, 2000). Good examples of balustrades using balusters include staircases and railings around balconies. In all cases, the balusters are held in place by upper and lower elements like a floor and a rail. Balusters are usually waist-high and in architecture they often have a practical purpose, forming a barrier that prevents someone from falling from a high place. Balusters can be found in all kinds of buildings, from homes and palaces to churches and concert halls. Balusters are more than just attractive

aesthetic additions to railings. They serve several purposes within a railing's overall structure. First, balusters support the handrail. Balusters also close the gaps between posts, acting as safety features by eliminating excess space through which someone could fall.

A baluster is a vertical moulded shaft, square, or lathe-turned form found in stairways, parapets, and other architectural features. In furniture construction it is known as a spindle. Common materials used in its construction are wood, stone, and less frequently metal and ceramic. A group of balusters supporting a handrail, coping, or ornamental detail are known as a balustrade (Seeley, 2014). The term baluster shaft could be used to describe forms such as a candlestick, upright furniture support, and the stem of a brass chandelier. The term banister (also bannister) refers to a baluster or to the system of balusters and handrail of a stairway. It may be used to include its supporting structures, such as a supporting newel post before installation of plaster of Paris.

A white powdery slightly hydrated calcium sulfate $CaSO_4 \cdot {}^1/_2H_2O$ or $2CaSO_4 \cdot H_2O$ made by calcining gypsum and used chiefly for casts and molds in the form of a quick-setting paste with water. It is also a quick-setting gypsum plaster consisting of a fine white powder (calcium sulfate hemihydrate), which hardens when moistened and allowed to dry (Henry & Stewart, 2011). Known since ancient times, plaster of paris is so called because of its preparation from the abundant gypsum found near Paris.

Plaster of paris does not generally shrink or crack when dry, making it an excellent medium for casting molds. It is commonly used to precast and hold parts of ornamental plasterwork placed on ceilings and cornices. It is also used in medicine to make plaster casts to immobilize broken bones while they heal, though many modern orthopedic casts are made of fibre glass or thermoplastics (Henry, et al 2011). Some sculptors work directly in plaster of paris, as the speed at which the plaster sets gives the work a sense of immediacy and enables the sculptor to achieve the original idea quickly. In medieval and

Renaissance times, gesso (usually made of plaster of paris mixed with glue) was applied to wood panels, plaster, stone, or canvas to provide the ground for tempera and oil painting. Plaster of paris is prepared by heating calcium sulfate dihydrate, or gypsum, to 120–180 °C (248–356 °F). With an additive to retard the set, it is called wall, or hard wall, plaster, which can provide passive fire protection for interior surfaces using 3D modeling skills (McKee, 2017).

3D modeling is the process of developing a mathematical coordinate-based representation of any surface of an object (inanimate or living) in three dimensions via specialized software by manipulating edges, vertices, and polygons in a simulated 3D space (Rector, 2019). There are three major types of 3D modeling that fall under the rubric of CAD software: solid modeling, wireframe modeling, and surface modeling. Three-dimensional (3D) models represent a physical body using a collection of points in 3D space, connected by various geometric entities such as triangles, lines, curved surfaces, etc. Being a collection of data (points and other information), 3D models can be created manually, algorithmically (procedural modeling), or by scanning (Rector, 2019). Their surfaces may be further defined with texture mapping. Acquisition these skills would enhance self- reliance of graduates.

Self-reliance simply means reliance on one's own efforts and abilities (Fonchingong & Lotsmart, 2013). According to Bhurtel (2015) when somebody acquires skills in any occupation, such person can establish his or her own business and even employ others, such person according to him is self-reliant. Self-reliance emphasized, "leads to national development". Chijioke and Tambari, (2017), in his opinion declared, self-reliance as that which pre-supposes the attainment and autonomy without unnecessarily resorting to begging or browning. He emphasized that, "a self-reliant individual is one that achieves steady supply of his needs, one that diversifies his resources to reduce dependency on

others for assistance" Thus, self-reliance emphasizes growth and development in the life of a citizen, politically, socially and economically. Therefore, a man who is potently self-reliant will ensure an effective control of his resources over national life for proper national development for example Dangote and Adenuga etc.

Education is the oldest field of endeavor known to humanity. Nations are in a race to develop and improve their educational system because, according to Vijay (2017), Education is a tool that improves functional and analytical ability and thereby opens up opportunities for individuals and groups to achieve greater access to labour markets and livelihoods. Education is not only an instrument of enhancing efficiency but is also an effective tool of widening and augmenting democratic participation and upgrading the overall quality of individual and societal life. To this end, one of the philosophies of education as enshrined in the Federal Republic of Nigeria (FRN) (2013) is the belief that education is an instrument of national development and social change. It is a universal fact that no society can develop beyond the educational level of its citizenry. Therefore, to develop a nation economically, one needs to develop the educational system. Education provides individuals with the opportunity for self-empowerment through intellectual development, skill acquisition, vocational development and, environmental awareness.

The term Technical and Vocational Education is a conjoined term made up of Technical Education (TE) and Vocational Education (VE). It is aspect of Nigerian educational system that provides room for vocational training, skill acquisition and adequate scientific competence. Many even in the academia have tried to classify this system of education under the banner: vocational education, technical education, vocational and technical education, technical and vocational education and training. In his efforts that draw a dichotomy, Okoye (2013) postulated that, many educators hardly differentiate between the terms Technical and Vocational Education while society has been led to believe that

Vocational Education is for those who are incapable of pursuing technical academic programmes. Against this background, Technical and Vocational Education has made slow progress from its earliest times to date in the developed countries.

The Technical and Vocational Education and Training (TVET) is the inclusion of basic technical and scientific knowledge with the skill-based vocational programmes. United Nations Educational Scientific and Cultural Organization (UNESCO, 2013) defined TVET as, refers to all forms and levels of the educational process involving, in addition to general education, the study of technologies and related sciences and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupation in various sectors of economic life. This is the higher level of skills and knowledge required to be taught as advanced learning prior to workplace entry to cope with the emergence of technologies in the workplace. Technical and Vocational Education programmes are offered at Vocational Training Institutes and Centers, Technical Colleges at the Secondary and college of education, polytechnics and universities at Post-Secondary Education level.

Wall and floor tilers work within commercial, residential, and public construction projects laying tiles onto different substrates. Tiling is an intricate and highly skilled profession and tilers work in many different environments, from large commercial projects to tiling swimming pools and bathrooms (Fred 2008). Tiles can be made of ceramics, mosaic, and natural stone. Likewise, the environment in which they are used is equally diverse: walls, floors, and staircases in houses, offices, gardens, factories, public buildings, and places of worship. That means that tilers may be expected to work both inside and out, accurately following designs, preparing surfaces, and laying tiles to the correct pattern and grouting to a high standard. They need to pay special attention to details such as level, plumb, square and tile alignment. Professionals in this area are also required in interact with clients, builders, architects and other trades people. Employment prospects will be good

for wall and floor tiling as growing construction of new buildings will create job opportunities for tilers. In addition, more wall and floor tiling specialists will be needed for remodelling and replacement projects in existing homes.

A tiler generally works on commercial and residential projects. There is a direct relationship between the nature and quality of the product required and the payment made by the customer. Therefore, the tiler has a continuing responsibility to work professionally in order to meet the requirements of the customer and thus maintain and grow the business (Osasona & Hyland, 2016). Tiling is closely associated with other parts of the construction industry, and with the many products that support it, normally for commercial purposes. The tiler works internally and externally, including in the homes of customers and on building sites, in all weather conditions and on small and major projects. The work includes the laying of tiles of ceramics, mosaic and natural stone on walls, floors and staircases in houses, commercial, industrial and public buildings, churches, swimming pools, outside installations and façades to provide protective and decorative finishes. It also includes the construction of small walls and steps from bricks or blocks.

The tiler will interpret drawings, set out and measure, remove any existing covering, prepare surfaces, lay the tiles in the desired pattern, grout and finish to a high standard. Work organization and self-management, communication and interpersonal skills, problem solving, innovation and creativity, and working accurately are the universal attributes of the outstanding tiler (Osasona & Hyland, 2017). Whether the tiler is working alone (many are self-employed or sub-contractors) or in a team on large projects, the individual takes on a high level of personal responsibility and autonomy. Experienced tilers may also specialize in one area of work such as mosaics and they can work for specialist tiling firms specializing for example in artistic work or competition swimming pools.

Baluster, one of a series of small posts supporting the coping or handrail of a parapet or railing. Colonnettes are shown as balusters in Assyrian palaces by contemporary bas-reliefs and are similarly used in many railings of the Gothic period. Although no Greek or Roman example of the baluster is known, the Italian Renaissance designers made great use of it, employing, instead of the medieval colonnette, forms richly molded and usually round (Aradeon, 2013). The Renaissance balusters generally had a capital, a base, and a vase-shaped form between. In early Renaissance work a form similar to two vases set base to base is frequent. The later Renaissance architects codified balusters into orders like columns, and those of the Baroque went to the other extreme of fantasy in baluster form. The term "baluster shaft" is used of any similar vertical shaft such as those found dividing the windows in Saxon work.

Balusters are more than just attractive aesthetic additions to railings. They serve several purposes within a railing's overall structure. First, balusters support the handrail. Balusters also close the gaps between posts, acting as safety features by eliminating excess space through which someone could fall. Balusters have served important structural and aesthetic functions for generations of architects. One of the earliest known uses of balusters occurred during China’s early and dynastic periods (Weaver, 2017). At that time, architects used prominent terraces to support buildings, and the terraces frequently featured balustrades. By the tenth century, Chinese architects used both marble and wooden balustrades in private residential gardens. These stylish touches often featured designs like birds, pomegranates, and lotus flowers. Classical stone balustrades became popular elsewhere in the world starting in the Renaissance period. Today’s balusters come in countless styles and shapes, although most of them follow a fairly uniform set of design standards. More elaborate balusters might resemble stacked vases, while others might take on an attractive double helix shape.

Technology is transforming nearly every industry, and construction is no exception. One form of tech that has recently had a substantial impact on the construction industry is three-dimensional (3D) modeling. 3D models have a major role in modern construction projects, as they can improve productivity and ease of work (Peddie, 2013). 3D modeling for earthworks and machine control can increase equipment operation accuracy, enhance worksite efficiency and reduce costs, among other benefits. So, how does this technology work, and how can you apply it to your next project? The term “3D modeling” refers to the process of creating a three-dimensional representation of an object using specialized software. This representation, called a 3D model, can convey an object’s size, shape and texture. You can create 3D models of existing items, as well as designs that have not yet been built in real life. In construction, 3D models of a worksite can be used for machine control. These replicas incorporate the points, lines and surfaces that make up the physical environment (Sikos, 2016). They use coordinate data that identifies the location of horizontal and vertical points relative to a reference point. Due to these spatial relationships, you can view the representation from various angles.

Machine control uses various positioning sensors to provide machine operators with feedback on things like target grades and bucket or blade position. The machine operators can reference the 3D model to ensure they are completing work accurately. GPS technology enables workers to locate the replica’s points in the field, and sensors on machines tell them where they are relative to the model’s points (Yu & Hunter, 2014). These control processes help crews translate the 3D model into reality by guiding equipment to construct the lines, points and surfaces precisely as described in the representation. Teams may also use 3D models for project, design and environmental compliance reviews. These models also help during pre-bidding, allowing contractors to test out various designs and communicate ideas. The methods and technologies used today

for 3D earthworks modeling would not exist without developments in civil surveying and various types of 3D modeling.

Plaster of Paris (POP) is a powder like the substance of white colour created from gypsum. It is made by heating gypsum to around 150 degree Celsius. It is a powder that is dry and hardens after mixing with water. This softens after drying. POP has wide applications in construction and architecture (Asante - Kyei, 2012). Plaster is a building material used for the protective or decorative coating of walls and ceilings and for moulding and casting decorative elements. In English, "plaster" usually means a material used for the interiors of buildings, while "render" commonly refers to external applications (Alrawashdeh, Al-Rawajfeh, Al-Bedoor, Al-Shamaileh & Al-Hanaktah, 2014). Another imprecise term used for the material is stucco, which is also often used for plasterwork that is worked in some way to produce relief decoration, rather than flat surfaces.

The most common types of plaster mainly contain either gypsum, lime, or cement, but all work in a similar way. The plaster is manufactured as a dry powder and is mixed with water to form a stiff but workable paste immediately before it is applied to the surface. The reaction with water liberates heat through crystallization and the hydrated plaster then hardens (Soyinka 2015). Plaster can be relatively easily worked with metal tools or even sandpaper, and can be moulded, either on site or to make pre-formed sections in advance, which are put in place with adhesive. Plaster is not a strong material; it is suitable for finishing, rather than load-bearing, and when thickly applied for decoration may require a hidden supporting framework, usually in metal.

Forms of plaster have several other uses. In medicine plaster orthopedic casts are still often used for supporting set broken bones. In dentistry plaster is used to make dental impressions (Pinheiro & Camarini, 2015). Various types of models and moulds are made

with plaster. In art, lime plaster is the traditional matrix for fresco painting; the pigments are applied to a thin wet top layer of plaster and fuse with it so that the painting is actually in coloured plaster. In the ancient world, as well as the sort of ornamental designs in plaster relief that are still used, plaster was also widely used to create large figurative reliefs for walls, though few of these have survived.

Clay plaster is a mixture of clay, sand and water with the addition of plant fibers for tensile strength over wood lath. Clay plaster has been used since antiquity. Settlers in the American colonies used clay plaster on the interiors of their houses: “Interior plastering in the form of clay antedated even the building of houses of frame, and must have been visible in the inside of wattle filling in those earliest frame houses in which …wainscot had not been indulged. Clay continued in the use long after the adoption of laths and brick filling for the frame." Where lime was not available or easily accessible it was rationed or substituted with other binders. In Martin E. Weaver’s seminal work he says, “Mud plaster consists of clay or earth which is mixed with water to give a “plastic” or workable consistency. If the clay mixture is too plastic it will shrink, crack and distort on drying. It will also probably drop off the wall. Sand and fine gravels were added to reduce the concentrations of fine clay particles which were the cause of the excessive shrinkage.” Straw or grass was added sometimes with the addition of manure (Acharya & Chandak, 2013).

Glass blocks, or bricks, can be used to create architectural structures such as partition walls or screen walls across part of a room, around a shower or bath, as part of stair constructions and so on. They are capable of dividing a room without blocking light transmission (Construction Training Fund 2014).

Glass block walls are not generally load-bearing, and may need to be strengthened by steel reinforcing rods positioned in the mortar, or by the framing into which they are

set. The reason they are not generally load-bearing is that, typically, glass blocks are manufactured hollow, i.e. they are two separate halves which are pressed together and annealed while still molten, leaving a partial vacuum at the centre. Blocks are produced in various square and rectangular sizes (typically 4 x 8", 6 x 8" and 8 x 8"), as well as in angled and curved shapes.

Since glass blocks cannot be cut to bespoke sizes, it is important to calculate how the standard sizes fit best into the space required. To roughly calculate the number of blocks required, the length of the wall can be multiplied by its height to find the overall area, before dividing this by the area of one glass block. This calculation does not allow for the mortar joints, and it is recommended to over-purchase in case blocks break during installation (National Management Consultants, 2006).

The first step in laying a glass block wall or screen is to lay out a single row of blocks to work out its general positioning, and the location of any openings (such as doors). If using a timber frame, this should be made to fit the chosen wall dimensions and fixed in place. Expansion foam is then nailed to the inside of the frame, which permits small amounts of movement due to thermal expansion. The foam should be positioned to sit centrally on each length of timber.

Spacers should be positioned inside the floor of the timber frame to hold the glass blocks. Mortar is then applied to the floor of the frame, between the spacers. After spreading mortar on one side of a glass block it is then placed onto the spacers, bedding it into the mortar along the frame. Once the full length of blocks has been laid, mortar is applied along the top (World Skill International, (WSI) 2013).

Reinforcing rods are applied to the horizontal joints (two per row of blocks), by drilling holes in the wall plate. For extra rigidity, rods can be applied to the vertical joints as well.

The rods should be pressed down into the mortar before continuing laying blocks on top. After every two courses, a wall tie should be screwed to the wall plate and bedded in mortar.

Nigeria as a one of the developing nations of the world is saddled with series of problems ranging from unemployment, poverty, youth restiveness, population explosion, and environmental degradation. The economic and social life of the nation has been sliding down as result of the economic recession. There are closure of industries, premature retirement and retrenchment of workers, inflation in the prices of goods and services, unemployment, scarcity of petroleum products, irregular payment of salaries, among others (Inyiangu, 2014). There is increase demand for better condition of living. Technical and Vocational Education (TVE) strives to solve these pressing problems of today and tomorrow. TVE is a skill-oriented programme that prepares individuals for purposeful living.

TVE improves the quality of life of people if appropriate skills are gained. TVE deals with knowledge, skills, competencies and aptitude that fit an individual wholly and entirely for work or business. For the poor and needy in the world, TVE provides the medium to secure an accessible, affordable and secured living. Unfortunately, developmental strategies in TVE practices in many countries (including Nigeria) quite often ignore the needs of the poor in their own country (Maigida, Saba & Namkere, 2013). TVE prepares individuals for jobs that are based on manual and practical activities in relation to specific trades, occupations or vocations. The learner directly develops expertise in a particular group of techniques or technology. As a result, TVE is related to the age-old apprenticeship system of learning. In time past, anyone who went to school and acquired some form of education was sure to get one form of paid employment or the other immediately after graduation. The present state of the depressed economy and the resultant

measure of unemployment has resulted in the need for every Nigerian to become self-reliant through self-employment. This calls for entrepreneurship education as its major aim is to encourage and train university, polytechnics and secondary school graduates to take up self-employment. This is why motivation is central to entrepreneurship. The characteristics that are common to entrepreneurship include:

i. The desire to create a new business;
ii. The freedom to determine one's destiny;
iii. The need for independence and the willingness to meet challenges;
iv. The need for motivation, great determination and perseverance (Bhurtel, 2015).

Statement of the Problem

The goal of technical education is to learn skills, practice it and be perfect in it. Hence, technical colleges were established to train individuals to acquire practical skills, basic scientific knowledge and attitudes required as craftsmen and technicians at sub-professional level, to meet the manpower needs for national development. A greater proportion of the problem confronting technical education in Nigeria today is rooted in the failure of technical institutions to impact appropriate skills, knowledge and attitudes to the students for gainful or self-employment upon graduation. The ultimate goal of any technical institution is skill development (Jonathan & Monday, 2017. Maigida, Saba and Namkere (2013) discovered that skills development provides the nation with the labour force needed for competitiveness and growth and as well enables young school leavers, the unemployed and other job seekers to perform gainful economic activity for a better living. The effort is geared towards poverty reduction.

Achieving the goals of technical education in technical colleges in the country is far below actualization because institutions are not well equipped to translate classroom theory into practice or simulation of real work situation. Supporting the problem of poor attainment of

goals, Ogbuanya and Oluwasola (2015) also identifies imbalance between theory and practice in addition to other factors mentioned. The problems identified are hinged on limited or dwindling nature of financial allocations to technical colleges by the government.

Workshop practice, industrial training/production work have been viewed as a partial panacea to the perennial shortage of training facilities in technical colleges. The production/service units are not functional if/where it exists owing to lack of finance and general lack of interest of the staff and students for production/service activities. Students Industrial Work Experience Scheme (SIWES) is not meeting the practical needs of students either because the supervision is not adequate or thorough. The questions are: would acquisition of modern building skills enhance students, performance, secure employment in the industries and enable students to create employment? Answers to the above questions gave rise to assess modern building skills required for self- reliance of students of Technical Colleges in Rivers State.

Purpose of the Study

The general aim of the study was to assess modern building skills required for self-reliance of students of Technical Colleges in Rivers State. Specifically, the study sought investigate the:

1. Tiling skills required for self- reliance of students of Technical Colleges in Rivers State.
2. Production and installation of baluster's skills required for self- reliance of students of Technical Colleges in Rivers State.
3. Three-Dimensional (3D) modelling skills required for self- reliance of students of Technical Colleges in Rivers State

4. Installation of Plaster of Paris (POP) skills required for self- reliance of students of Technical Colleges in Rivers State.

Research Questions

The following research questions were posed to guide the study:

1. What are the tiling skills required for self- reliance of students of Technical Colleges in Rivers State?
2. What are the production and installation of baluster's skills required for self- reliance of students of Technical Colleges in Rivers State?
3. What are the three-Dimensional (3D) modelling skills required for self- reliance of students of Technical Colleges in Rivers State?
4. What are the installation of Plaster of Paris (POP) skills required for self- reliance of students of Technical Colleges in Rivers State?

Hypotheses

The following hypotheses were formulated and tested at 0.05 level of significance

1. There is no significance difference between the mean responses of brick block laying and concreting teachers and instructors on the tiling skills required for self- reliance of students of Technical colleges in Rivers State.
2. There is no significance difference between the mean responses of brick block laying and concreting teachers and instructors on the production and installation of baluster's skills required for self- reliance of students of Technical colleges in Rivers State.
3. There is no significance difference between the mean responses of brick block laying and concreting teachers and instructors on the three-Dimensional (3D) modelling skills required for self- reliance of students of Technical colleges in Rivers State

4. There is no significance difference between the mean responses of brick block laying and concreting teachers and instructors on the installation of Plaster of Paris (PoP) skills required for self- reliance of students of Technical colleges in Rivers State.

Methodology

This study adopted a descriptive survey research design. The descriptive survey research design is considered suitable because the study elicited data/information from respondents on modern building skills required for self- reliance of students of Technical Colleges in Rivers State. The study was carried out in Rivers State Nigeria and had a population of 65 respondents, comprising 40 brick/block laying teachers and 25 instructors in the four Government Technical Colleges in Rivers State (field survey, 2021). The study was a census as the entire population was studied.

The instrument for data collection was a structured questionnaire titled "Modern Building Skills Questionnaire". The instrument contains five sections A-F. The instrument was structured on five point likert type rating scale of Strongly Agree (SA), Agree (A), Undecided (U), Disagree (D) and Strongly Disagree (SD). A corresponding numerical value of 5, 4,3,2 and 1 was assigned to the response scale for each item as represented below with real limits. The instrument was subjected to face-validation by three experts. The experts' comments and suggestions were utilized to structure the new questionnaire instrument that will be used for the study. The internal consistency of the instrument was established using test-retest reliability method. This gave a reliability coefficient of 0.68 with the aid of SPSS.

The questionnaire were administered and retrieved by the researcher and the three research assistants from the designated technical colleges for analysis. A total of 65 questionnaire were distributed but 62 questionnaires were retrieved which showed 98% returns. Data

collected from the respondents were analyzed using mean and standard deviation to answer the research questions and t-test statistics were used to test the null hypotheses at 0.05 level of significance. The decision for hypothesis was; if the calculated value of t (t-cal) is less than or equal to the critical value of (t-crit), accept the null hypothesis, otherwise rejected null hypothesis. The computation of the mean, standard deviation and t-test was carried out with statistical package for social sciences (SPSS).

Results and Analysis

Research Question 1: What are the tiling skills required for self- reliance of students of Technical colleges in Rivers State?

Table 1: Mean and Standard Deviation on Tiling Skills Required for Self-Reliance

		Teachers			**Instructors**		
S/NO	**Tiling skills required for self-reliance**	**X**	**SD**	**RMK**	**X**	**SD**	**RMK**
1	Identify the different quality of tile	3.57	.692	SA	3.81	1.039	A
2	Determine the quality of tiles from a building plan.	3.56	.732	SA	4.11	.859	A
3	Take accurate measurement	4.28	.750	A	4.35	.719	A
4	Use and maintain tools and equipment.	4.93	1.004	A	3.95	.932	A
5	Prepare work surface.	4.16	.941	A	4.42	.844	A
6	Soak tiles in water	4.95	.875	A	4.09	.860	A
7	Locate walls, positions of outlets and tile features form drawing.	4.25	.931	A	4.32	.736	A
8	Determine datum levels, depths and heights	4.99	1.088	A	4.31	.790	A
9	Mix mortar to be applied on the surface of tiles	4.05	.990	A	4.42	.625	A
	Grand Mean	4.31	0.88	A	4.19	0.83	**A**

Data in Table 1 revealed that teachers had a mean range of 3.56-4.99 and standard deviation range of 0.69-1.08. While the Instructors had a mean range of 3.81-4.42 and standard deviation range of 0.71-1.04. The standard deviation shows the homogeneity of the respondents. The mean shows that the respondents agreed on the tiling skills required for self- reliance of students of Technical colleges in Rivers State.

Research Question 2: What are the production and installation of baluster's skills required for self- reliance of students of Technical colleges in Rivers State?

Table 2: Mean and Standard Deviation on Production and Installation of Baluster's Skills Required for Self-Reliance

		Teachers			**Instructors**		
S/NO	**Production and Installation of Baluster's Skills Required for Self-Reliance**	**X**	**SD**	**RMK**	**X**	**SD**	**RMK**
1	Design a baluster	4.23	.834	A	4.07	.838	A
2	Create different designs on the balusters.	4.40	.821	A	4.09	.808	A
3	Determine the height, size of a balusters from a working drawing.	4.09	.722	A	4.04	.947	A
4	Identify the right type of aggregate for the production of balusters.	4.18	.658	A	4.19	.766	A
5	Determine an appropriate mix ratio.	4.05	.924	A	4.12	.982	A
6	Mix the concrete.	4.19	.953	A	4.39	.774	A
7	Pour concrete into the mould	3.99	.881	A	4.19	.860	A
8	Compact the concrete in the mould.	3.95	.990	A	4.26	.856	A
9	Remove the baluster in the mold without breaking the balusters.	3.98	1.03	A	4.32	.776	SA
10	Drill holes on the balusters.	4.19	1.04	A	4.21	.725	A
	Grand Mean	**4.13**	**0.89**	**A**	**4.19**	**0.83**	**A**

Data in Table 2 revealed that teachers had a mean range of 3.98-4.40and standard deviation range of 0.65 - 1.04. While the Instructors had a mean range of 4.40-4.39and

standard deviation range of 0.72 - 0.94. The standard deviation shows the homogeneity of the respondents. The mean shows that the respondents agreed on the production and installation of baluster's skills required for self- reliance of students of Technical colleges in Rivers State.

Research Question 3: What are the three-Dimensional (3D) modelling skills required for self- reliance of students of Technical colleges in Rivers State?

Table 3: Mean and Standard Deviation on Three-Dimensional (3d) Modelling Skills Required for Self-Reliance

S/NO	Three-Dimensional (3D) Modelling Skills Required for Self-Reliance	Teachers X	SD	RMK	Instructors X	SD	RMK
1	Computer appreciation skills	4.23	.881	A	4.34	.797	A
2	Spatial plan reading skills	4.44	.926	A	4.16	.902	A
3	Spatial visualization skills	4.11	.858	A	3.70	1.059	A
4	Spatial awareness skills	4.26	.897	A	3.86	1.025	A
5	Spatial estimation skills	4.09	.989	A	4.17	.891	A
6	Spatial integration skills	4.18	.889	A	4.25	.830	A
7	Spatial construction skills	3.97	.954	A	4.26	.809	A
8	Engineering graphics skills	4.04	1.017	A	4.32	.827	A
9	Technical design skills	3.88	.880	A	4.02	.979	A
10	Spatial manipulations skills	3.61	0.99	A	4.02	1.06	A
	Grand Mean	4.08	0.93	A	4.11	0.92	A

Data in Table 3 revealed that teachers had a mean range of 3.61-4.44and standard deviation range of 0.88 - 1.02. While the Instructors had a mean range of 3.70-4.34 and standard deviation range of 0.79 - 1.06. The standard deviation shows the homogeneity of the respondents. The mean shows that the respondents agreed on the three-Dimensional

(3D) modelling skills required for self- reliance of students of Technical colleges in Rivers State.

Research Question 4: What are the installation of Plaster of Paris (POP) skills required for self- reliance of students of Technical colleges in Rivers State?

Table 4: Mean and Standard Deviation on Installation of Plaster of Paris (POP) Skills Required for Self- reliance

S/NO	Installation of Plaster of Paris (POP) Skills Required for Self-reliance	Teachers X	SD	RMK	Instructors X	SD	RMK
1	Take accurate measurement.	4.22	.856	A	4.03	.929	A
2	Estimate the quantity of POP material from a building drawing.	3.58	.706	SA	4.02	.876	A
3	Correctly use hand tools for POP.	4.09	.785	A	4.22	.932	A
4	Identify and select the appropriate mould.	3.98	.719	A	4.39	.840	A
5	Prepare the mould.	4.17	.921	A	4.03	.982	A
6	Create different designs.	4.11	.994	A	3.98	.744	A
7	Determine the quantity of yarn required in a project.	4.27	.877	A	3.88	.982	A
8	Separate the yarn.	3.93	.863	A	4.07	.923	A
9	Determine the quantity of water and POP powder to be mixed.	4.34	0.86	A	3.63	0.59	A
10	Molding of plane.	3.55	0.67	A	3.86	0.49	A
	Grand Mean	4.02	0.83	A	4.01	0.83	A

Data in Table 4 revealed that teachers had a mean range of 3.55-4.34 and standard deviation range of 0.67-0.99. While the Instructors had a mean range of 3.63-4.39 and standard deviation range of 0.49 - 0.98. The standard deviation shows the homogeneity of the respondents. The mean shows that the respondents agreed on the installation of Plaster

of Paris (PoP) skills required for self- reliance of students of Technical colleges in Rivers State.

Hypotheses

H_{O1} There is no significance difference between the mean responses of brick block laying and concreting teachers and instructors on the tiling skills required for self- reliance of students of Technical colleges in Rivers State.

Table 5: t-test Analysis on Tiling Skills Required for Self- reliance of Students

Respondents	N	$\overline{X}$	SD	α	DF	t-Cal	t-Crit	RMK
Teachers	38	4.31	0.88					
				0.05	61	1.22	1.96	No Sig
Instructors	23	4.19	0.83					

Result in Table 5 revealed that t-cal (1.22) is less than t-crit (1.96) which indicates that the hypothesis stated was accepted. Therefore, there is no significance difference between the mean responses of brick block laying and concreting teachers and instructors on the tiling skills required for self- reliance of students of Technical colleges in Rivers State.

H_{O2} There is no significance difference between the mean responses of brick block laying and concreting teachers and instructors on the production and installation of baluster's skills required for self- reliance of students of Technical colleges in Rivers State.

Table 6: t-test Analysis on Production and Installation of Baluster's Skills Required for Self- reliance of Students.

Respondents	N	$\overline{X}$	SD	α	DF	t-Cal	t-Crit	RMK
Teachers	38	4.12	0.85					

				0.05	61	1.23	1.69	No Sig
Instructors	23	4.19	0.83					

Result in Table 6 revealed that t-cal (1.32) is less than t-crit (1.69) which indicates that the hypothesis stated was accepted. Therefore, there is no significance difference between the mean responses of brick block laying and concreting teachers and instructors on the production and installation of baluster's skills required for self- reliance of students of Technical colleges in Rivers State.

H_{O3} There is no significance difference between the mean responses of brick block laying and concreting teachers and instructors on the three-Dimensional (3D) modelling skills required for self- reliance of students of Technical colleges in Rivers State.

Table 7: t-test Analysis on Three-Dimensional (3d) Modelling Skills Required for Self- reliance of Students.

Respondents	**N**	**$\bar{X}$**	**SD**	**α**	**DF**	**t-Cal**	**t-Crit**	**RMK**
Teachers	38	4.08	0.93					
				0.05	61	1.21	1.96	No Sig
Instructors	23	4.11	0.92					

Result in Table 7 revealed that t-cal (1.21) is less than t-crit (1.96) which indicates that the hypothesis stated was accepted. Therefore, there is no significance difference between the mean responses of brick block laying and concreting teachers and instructors on the three-Dimensional (3D) modelling skills required for self- reliance of students of Technical colleges in Rivers State.

H_{O4} There is no significance difference between the mean responses of brick block laying and concreting teachers and instructors on the installation of Plaster of Paris (PoP) skills required for self- reliance of students of Technical colleges in Rivers State.

Table 8: t-test analysis on Installation of Plaster Of Paris (Pop) Skills Required For Self- reliance of Students.

Respondents	N	X	SD	α	Df	t-cal	t-tab	RMK
Teachers	38	4.02	0.82					
				0.05	61	1.46	1.96	No Sig
Instructors	23	4.01	0.82					

Result in Table 8 revealed that t-cal (1.46) is less than t-crit (1.69) which indicates that the null hypothesis stated was accepted. Therefore, there is no significance difference between the mean responses of brick block laying and concreting teachers and instructors on the installation of Plaster of Paris (POP) skills required for self- reliance of students of Technical colleges in Rivers State.

Discussion of Findings

The findings of the study revealed that the respondents agreed on the tiling skills required for self- reliance of students of Technical colleges in Rivers State. The findings of the study is in line with the Akpan and Williams (2014) who stated that synergizing TVET with Work-Base Learning (WBL) may be a powerful tool for national development, economic enlightenment and self-reliance and citizenship empowerment. Previous studies revealed that fourth industrial revolution has mixed feelings in the minds of the graduates, for instance; mass job losses and newer jobs that may require highly skill graduates to perform. The solution to nib the challenges in the bud is to shift from predominantly skills acquisition through school-based training to blending it with work-based training.

The findings of the study showed that the respondents agreed on the production and installation of baluster's skills required for self- reliance of students of Technical colleges in Rivers State. The findings of the study is in agreement with Akpan and Umana (2017)

who states that TVET provides relevant skills and knowledge to the learners for the economic and technological advancement of any nation. This study also corroborates the views of Aliyu and Kabiru (2014) who posits that technical vocational education and training has trained many Rivers youths in building construction and bricklaying for employment generation.

The findings of the study showed that the respondents agreed on the three-Dimensional (3D) modelling skills required for self- reliance of students of Technical colleges in Rivers State. The findings of the study is in accordance with Ayonmike and Okeke (2015) who stated that TVET as an instrument for employment and wealth creation that inculcates in learners, adequate technical skills and knowledge for productive work in a chosen occupation. Similarly, this finding corroborates Badawi, (2013) who posit that TVET has trained many youths in electrical and electronic maintenance and repair skills for employment generation in Rivers State.

The findings of the study showed that the respondents agreed on the installation of Plaster of Paris (PoP) skills required for self- reliance of students of Technical colleges in Rivers State. The findings of the study is in agreement with Ezeani and Urama (2014) who opines that TVET institutions in Nigeria experienced infrastructural decay in the areas of inadequate workshops, laboratories, machines, computers, tools and other educational resources thereby making technology students suffer in the practical aspect of their training.

The apparent low level of exposure of students in training to acquire practical skills in the school workshops is largely dependent on lack of physical facilities (workshop, laboratories, equipment and tools). Agreeing to this fact, Mohamad, Mohd, Napsiah, Mohammad and Abd Rauf, (2010) observed that the shortfall in training facilities has led to little or no practical experience from the school before graduation. Nwankwo and Obeta

(2013) stressed that failure rates have been associated with quality and quantity of teacher, and quality of teaching methods and facilities.

Conclusion

To be self-employed, bricks/block laying and concreting students must be capable of laying tiles. Ability to measure accurately, cure the interlocking blocks and laying different types of interlocking patterns competencies required in the production and laying of interlock paver blocks bricks/block laying and concreting students should be capable molding and installing POP. Mixing of concrete of concrete, interpreting working drawings are technical competencies required in the production and installation of balusters.

Recommendations

The following recommendations are made on the basis of the findings of the research

i. Seminars, workshops and conferences should be regularly organized for teachers and workshop attendants. Where experts in the industries will train the teachers, workshop attendants and on the current technical competencies and skills in order for them to be updated with the current trends in the production and installation of interlock concrete paver.

ii. Block-laying and concreting students should be placed on industrial training and should be strictly supervised since this will create excellent opportunities to acquire the technical competencies required for production and installation of balusters.

iii. Greater emphasis should be made on practical classes by the teachers and attendants in order to acquire the tiling and other skills required for employment.

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