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Practical Skills Expected of Block/Brick Laying and Concreting Students in Technical Colleges in Rivers State

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ABSTRACT

The study identified the practical skills expected of block laying, brick laying and concreting students in technical colleges in Rivers State, Nigeria. The population of the study consisted of 80 respondents, comprising of 70 registered builders from the ministry of works and housing and 10 block laying, brick laying and concreting teachers of the three National Board for Technical Education (NBTE) accredited technical colleges in Rivers State offering the course. To guide the research, a question was developed and a hypothesis was formulated. An instrument was developed and validated by experts; subsequently it was used by the researchers to obtain information from the respondents. Mean and the standard deviation were used to analyse the research question, while t- test was used to test the hypothesis at 0.05 level of significance. Findings revealed a 44-item practical skills list expected of students of block laying, brick laying and concreting in technical colleges in Rivers State. It was also found that there is no significant difference in the mean response of technical teachers and registered builders in block laying, brick laying and concreting. Regular field trips to construction sites, acquisition of modern machines and equipment, deepened collaboration with private construction firms for enhanced trained of students were recommended.

KEYWORDS: *Block, brick, construction, concrete, TVET, building, skills*

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INTRODUCTION

Skills and knowledge are the engines of economic growth and social development of any nation (Okwelle and Dokubo, 2018). The educational process equips individuals with the relevant knowledge, skills and character for purposeful living in a society. Furthermore Dokubo (2017), opined that entrepreneurship education contributes greatly to the growth of any nation's economy including our country Nigeria. This is because education involves a process of training that is designed to give the required knowledge, acquire skills and capabilities that could lead to the development of mental alertness and the right approach to life. This implies that if education is adequately inculcated in human-kind, individuals would meaningfully help themselves and positively contribute to the growth and welfare of their immediate community

According to Federal Republic Nigeria on National Policy on Education (FRN, 2013), TVET is defined as a comprehensive term referring to those aspects of the educational process involving, in addition to general education, the study of technologies and related sciences, and the acquisition of practice skills, attitudes, understanding and knowledge relating to occupations in various sectors of economic and social life. The goals of vocational-technical education shall be to provide trained manpower in applied sciences, technology and business particularly at the craft, advanced craft and technical levels. Provide the technical knowledge and vocational skills necessary for Agricultural, Commercial and Economic development, acquire technical and vocational skills. Give training and impart the necessary skills to the individual who shall be self-reliant economically. Hence, these objectives listed are drives by the formal vocational institutions in Nigeria such as polytechnics, mono technics and technical colleges (National Board for Technical Education, 2013).

Technical colleges are regarded as one of the principal Technical Vocational Education and Training (TVET) institution in Nigeria for the training of craftsmen. Adebayor (2010), stated that technical college students are students who are acquiring skills in Technical College Education programme in a particular occupation, trade or craft. Block laying, brick laying and concreting is among the trades offered in technical colleges in Rivers State, Nigeria.

Blocks are generally made of concrete. Because they are formed in steel moulds and the material is relatively stable, the size of individual units can be controlled to within small tolerances. The Block most commonly used is hollow and is often referred to by its nominal size i.e., 400 mm long, 200 mm wide and 200 mm high. Because an allowance is made for 10 mm wide mortar joints, the actual size of the block is 390 mm x 190 mm x 190 mm. To avoid the need for cutting, 3 /4, 1 /2 and 1 /4 length blocks are made which are called specials. Other specials are made to form lintels, control

joints etc. The range of blocks with a Nominal width of 200 mm is referred to as the 200 mm Series. Less commonly used blocks are the 100 mm, 120 mm, 150 mm and 300 mm series. Some blocks in the 100 mm series are solid. Note that a building module 600 mm x 600 mm contains three courses of 11 /2 blocks = 41 /2 blocks.

Bricks are often made of clay. They can undergo shape changes during manufacture, particularly in the firing process, and individual units can vary considerably in size. Tolerances are measured by placing 20 units together, which measures the average size, but not the variation of individual units. Bricks are usually solid or cored and generally made to a traditional size, 230 mm long, 110 mm wide and 76 mm high.

Block/brick laying is the act of building a wall by placingblocks/bricks on each other usually with cement between the surfaces of the bricks

The building methods for bricks or blocks are the same. Joints between bricks should never be in line with the joints in the course below. Good bonding between courses ensures that the forces applied to the wall are effectively distributed. The structure then remains stable and strong and functions as one unit. Unbounded or insufficient bonding results in vertical joints with the accompanying risk of failure. The basic laying procedure for block and brick walls is the same for all types of block and brick and is identical to the procedure for block foundation walls.

Concrete is a common building material used in a number of structures, such as floors, walls, columns, lintels, beams and roofs. It can be cast in any desired shape and fashion and is therefore applicable for most building purposes. Concrete does not rot, rust or decay and is resistant to wind, water, rodents and insects.

Concrete consists of cement, sand and coarse aggregate mixed together with water. The aggregate is a mixture of stone of various sizes. When water is added, a chemical process takes place primarily with cement, causing the mix to harden. While concrete performs well under compression, it does not tolerate tension well. To improve its strength, steel bars are added to the concrete in places where tensile stress is expected to occur - such as in beams and slabs. Consequently the load bearing capacity of this composite material, called Reinforced Cement Concrete, (RCC), is significantly better compared to when concrete or steel members are used in isolation. With reinforcement steel firmly embedded into the concrete, it can be used to build strong load bearing structures such as columns, beams and slabs. Concrete is cast in moulds referred to as formwork or shuttering. Usually, the formwork used for walls, columns, beams and slabs is assembled by joining wooden boards edge on edge. The advantage of using wood is that it can easily be used to create any required shape. Plywood, laminated boards and metal are also commonly used for formwork.

Concreting operations as seen in the NABTEB curriculum (2007), after Mix proportions (Cement - aggregate ratio; water-cement ratio), the stages in concreting are:

1. Batching
2. mixing
3. transporting
4. placing
5. curing

According to Dokubo (2019), practical skill entails performances/tasks done by hand or with human intervention using equipment, tools or technology requiring guidance, force or movement. Dokubo (2019), stated that the fundamental characteristics of vocational-technical schools should not be to purse systematicness and completeness of theory but to emphasize integrity and practicability of practical capacity. Thus, it is very vital that students offering trades such as block laying, brick laying and concreting are very sound and competent practical-wise. It is important these skills are clearly spelt out and identified; hence this research work.

Statement of the Problem

The population of Nigeria and especially Rivers State is on the rise and there is a growing housing and infrastructural deficit. According to Olugbenga, Yusoff, Aziz and Baba (2017), the housing deficit in Nigeria currently stands at about 17 million units along with other crucial building and civil construction works the country needs. However, one of the critical stakeholders in tackling these issues are well-trained skilled individuals in the field of block laying, brick laying and concreting. According to the National Board for Technical Education National, Vocational Certificate (NVC) Curriculum and Course Specifications in Block-Laying and Concreting (2007), the National Vocational Certificate in Block-Laying and Concreting is aimed at producing skilled and self-reliant craftsmen that can execute and coordinate block-laying and concreting work in a construction project.Hence, the research was undertaken to identify the practical skills expected of students offering the trade in technical colleges in Rivers State.

Purpose of the Study

The purpose of this study was specifically to identify the practical skills expected of students offering block/brick laying and concreting in technical colleges in Rivers State.

Research Question

To guide the research, this research question was formulated:

1. What are the practical skills expected of students offering block laying, brick laying and concreting trade in technical colleges in Rivers State?

Hypothesis

The null hypothesis (H_0) was tested at 0.05 level of significance.

H_{01}: There is no significant difference in the mean responses of registered builders from the ministry of works and housing and technical teachers on the practical skills expected of students offering the trade in technical colleges in Rivers State

Materials & Methods

The study adopted a descriptive survey design. The study was conducted in Rivers State. The population of the study consisted of 80 respondents, comprising of 70 registered builders from the ministry of works and housing, Port Harcourt and 10 block laying, brick laying and concreting teachers of the three National Board for Technical Education (NBTE) accredited technical colleges in Rivers State offering the course, namely GTC Port Harcourt, GTC Ahoada and GTC Tombia. No sample was taken considering the manageable size of the population. Hence, the entire population was used for the study. A self-designed instrument titled "Practical Skills for Block Laying, Brick Laying and Concreting

Questionnaire" (PSBLBLCQ) was used to collect data for the study. The instrument was divided into two sections A and B. Section A sought information on the respondent's demographic data while section B was used to elicit information on the practical skills expected of block laying, brick laying and concreting students. The instrument was designed on five-point Likert scale with number values which include: Strongly Agree (SA) = 5, Agree (A) = 4, Undecided (U) = 3, Disagree (D) = 2 and Strongly Disagree (SD) =1. The instrument was validated by four experts. Two head of civil construction firms in Rivers State and two senior lecturers from the Department of Vocational and Technology Education, Rivers State University, Port Harcourt. The reliability of the instrument was determined through the pilot test method for a measure of its ability. The result of the Pilot test was subjected to Cronbach-Alpha which yielded 0.87. The instrument was administered to the respondents by the researchers. The research question was analyzed using mean and standard deviation. Mean values greater than or equal to 3.50 were accepted while mean values less than 3.50 were rejected. The hypothesis was tested using t-test statistics. When the t-calculated is lower than the t-critical, the hypothesis was accepted and when the t-calculated is greater than the t-critical, the hypothesis was rejected.

Results

Research Question 1

What are the practical skills expected of students offering block laying, brick laying and concreting trade in technical colleges in Rivers State?

Table 1 Mean and Standard Deviation on the practical skills expected of students offering block laying, brick laying and concreting trade in technical colleges in Rivers State

	Registered Builders			Technical Colleges Teachers		
S/N	Expected practical skills in block/brick laying and concreting	X	SD	Remark	X	SD	Remark
	Block/Brick Laying Practical Skills						
1.	Section off the corners with wooden stakes	3.71	1.01	Accepted	3.77	1.91	Accepted
2.	Use a cord or string to tie off the corners' edges	3.68	0.98	Accepted	4.02	0.88	Accepted
3.	Attach a cord or string to the wooden stake used to mark the corners.	3.95	1.12	Accepted	4.01	11.2	Accepted
4.	Prepare footing for the bock/brick placement.	3.99	1.01	Accepted	3.99	1.11	Accepted
5.	Dig out a trench for the foundation.	4.0	1.13	Accepted	3.98	1.01	Accepted
6.	Double the width of the concrete block with two strips of 2x4s. Hold the 2x4s in place using wooden stakes along the outer wall.	3.88	0.99	Accepted	4.03	0.79	Accepted
7.	Pour the base concrete. Fill the frame up to the edge.	4.1	1.08	Accepted	4.00	1.18	Accepted
8.	Level the freshly poured concrete by running a 2x4 across the top	4.0	1.11	Accepted	3.68	0.96	Accepted
9.	Fill any spots that are low with additional concrete.	3.71	0.97	Accepted	3.89	0.95	Accepted
10.	Use trowel to spread a few slabs of mortar around the corner's base of the footing.	4.12	0.89	Accepted	4.03	0.85	Accepted
11.	Spread the mortar 1" deep and 8" wide in the marked area.	3.64	0.97	Accepted	4.10	0.95	Accepted
12.	Continue to spread the mortar to account for the distance of about three to four blocks	3.99	1.02	Accepted	4.09	1.12	Accepted
13.	Set the corner bricks/blocks	4.17	1.04	Accepted	4.12	1.41	Accepted
14.	Apply mortar to each side of the concrete block/brick (after soaking and allowing to dry) using trowel	4.11	0.97	Accepted	4.03	0.99	Accepted
15.	position the block/brick in the desired location	3.99	0.99	Accepted	3.97	0.98	Accepted
16.	align the corner to the string set up earlier	4.02	1.01	Accepted	4.03	1.16	Accepted
17.	Start laying blocks from the corner or edge of the wall so you can work in one direction	4.16	0.97	Accepted	4.07	0.94	Accepted
18.	Check the alignment of the first set of blocks/bricks using spirit level.	3.73	1.07	Accepted	3.96	1.01	Accepted
19.	Check both the outside and center section of the bricks using spirit level.	4.07	0.98	Accepted	3.98	0.93	Accepted
20.	Tap the blocks for any alignment adjustments while the mortar is still wet	4.11	0.94	Accepted	4.01	0.97	Accepted
21.	Measure the length and height every two or three layers.	3.91	1.02	Accepted	4.00	0.96	Accepted
22.	Apply mortar to the top.	3.88	1.01	Accepted	3.97	0.97	Accepted
23.	spread the mortar so it covers the length of about 3 blocks in the block/brick laying direction	4.02	0.99	Accepted	4.12	0.93	Accepted
24.	Stack the blocks: Lay the block/brick down on top so the edge of the top block aligns with the halfway mark of the bottom block/brick	4.14	1.12	Accepted	4.13	1.07	Accepted
25.	Brush the face of the block/brick with a "foxtail" brush to wipe away excess mortar and finish smoothing the joint	3.95	1.10	Accepted	3.91	0.90	Accepted
26.	Add reinforcement: Place the ¼" reinforcement rods into the openings with the ends overlapping about 2" or 3".	3.87	1.07	Accepted	3.88	1.12	Accepted

27. After centering the final "closure" block/brick in the course, remove the string line and clean up the front of the joint	4.03	0.96	Accepted	3.96	0.99	Accepted
28. Cut off mortar that squeezes out of the joint	4.10	0.88	Accepted	4.02	0.83	Accepted
29. Mortar should be discarded and not re-tempered, after the initial set of the cement has taken place	3.91	1.00	Accepted	4.11	1.02	Accepted
Concreting Practical Skills						
30. Check that the formwork is complete and that the reinforcement has been properly assembled.	3.66	0.99	Accepted	3.92	0.93	Accepted
31. Check the quality of materials prior to mixing concrete: potable water, cement grade and manufacturing date, and quality and purity of sand and aggregate.	4.02	1.02	Accepted	3.85	1.05	Accepted
32. An appropriate mortar mix (measurement) should be selected.	4.01	1.11	Accepted	3.88	1.17	Accepted
33. The mortar should be batched accurately using some consistent form of volume measurement.	3.89	0.87	Accepted	3.9	0.96	Accepted
34. Place and spread aggregate and sand on a clean platform or other hard surface.	3.76	0.96	Accepted	3.86	1.02	Accepted
35. Add cement on top of the sand.	3.93	0.97	Accepted	3.97	0.91	Accepted
36. Thoroughly mix aggregate, sand and cement until it achieves a uniform grey texture with the aid of a shovel or concrete mixer. (sand, aggregate and cement are mixed together dry at least three times before adding water in order to achieve a good mix)	4.07	1.10	Accepted	4.03	1.08	Accepted
37. Dig a hole in the centre of the heap and carefully add water.	4.07	0.99	Accepted	4.12	1.03	Accepted
38. Continue mixing until the concrete has the desired consistency	3.69	1.03	Accepted	4.00	1.13	Accepted
39. Transport to the area where needed with a head pan or wheelbarrow	3.88	1.04	Accepted	4.12	1.06	Accepted
40. Use a large size float to finish and smoothen the surface after pouring the concrete	4.01	1.01	Accepted	3.89	1.03	Accepted
41. Leave formwork in place after pouring of concrete, cover the concrete with impermeable membrane after the formwork has been removed	3.99	0.98	Accepted	3.87	0.95	Accepted
42. Continuously wet the surface of the surface to prevent loss of moisture from it by spraying with water	3.86	0.97	Accepted	3.85	1.01	Accepted
43. Cure the concrete continuously for at least 14 days	3.91	0.99	Accepted	3.96	0.93	Accepted
44. Do not remove the shuttering before 14 days for spans below 4.5m and 21 days for spans more than 4.5m.	3.58	0.93	Accepted	4.12	0.98	Accepted

Table 1 shows that the opinions of respondents are greater than the criterion mean of 3.50. Signifying that the 44 practical skills items are accepted by the respondents as the practical skills expected of students in block laying, brick laying and concreting in technical colleges in Rivers State.

Hypothesis

H_{01}: There is no significant difference in the mean responses of registered builders from the ministry of works and housing and technical teachers on the practical skills expected of students offering the trade in technical colleges in Rivers State.

Table 2 t-test Analysis of the mean responses of registered builders from the ministry of works and housing and Technical Teachers on the practical skills expected of students in block laying, brick laying and concreting in technical colleges in Rivers State.

Group	x	SD	Df	Tcal	T tab	Remark
Registered builders	8.03	5.11	78	0.39	2.00	Accepted
Technical colleges teachers	8.87	5.02				

Table 2 shows the calculated t-value 0.39 at 78 degrees of freedom and 0.05 level of significance, while the table-value is 2.00. This implies that since the calculated t-value 0.39 is less than the table-value of 2.00. Hence, the null hypothesis is accepted. Based on this result, the researchers concluded that there is no significant difference in the mean responses of registered builders from the ministry of works and housing and technical teachers on the practical skills expected of students offering the trade in technical colleges in Rivers State.

Discussion of findings

The result of the analysis of hypothesis identified that there is no significant difference in the mean responses of motor vehicle technical teachers and motor vehicle industry technicians on the 44 practical skills expected of students of block/brick laying and concreting. This indicated that the registered builders and the technical colleges teachers had the same opinion on the effectiveness of these 44 practical skills items in the block/brick laying and concreting. This finding also signified that these skills items are very suitable and useful in brick/block laying and concreting. The finding is in line with Odu (2012), who stated that block/brick laying and concreting students need to have practical skills in mortar application, batching, curing. Also, Dokubo (2016) stated that in building construction, setting out, digging of trenches and appropriate laying of block courses are crucial practical skills needed.

Conclusion

It is very vital that block/brick laying and concreting students in Rivers State technical colleges are practically-skilled in the trade. In the world of work today, it is required that an individual is competent practical-wise. The purpose of this research was to determine the practical skills expected of these students. The study revealed 44 important practical skills needed by block/brick laying and concreting students in technical colleges in Rivers State.

Recommendations

The following are recommended by the researchers:

1. Regular field trips to construction sites,
2. acquisition of modern machines and equipment,
3. deepened collaboration with private construction firms for enhanced training of students.

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