

Effect of an Improvised Concrete Mixer on Students' Performance In Concreting In Technical Colleges In Rivers State

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ABSTRACT

The purpose of this research was to determine the effect of an improvised concrete mixer on students' performance in concreting in technical colleges in Rivers State. The study adopted research and development (quasi-experimental design). It involved the use of control group, pre-test/post-test design. A population of 60 students from the three technical colleges accredited to offer block/brick laying and concreting in Rivers State was used for the study. The researchers developed an instrument for data collection- Concreting Achievement Test (CAT). The test items were identified and selected from the content of (NABTEB) syllabus on block/brick laying and concreting. Test re-test method was used to establish the reliability of the instrument. Six experts in the field of concreting were consulted for the face and content validity of the improvised concrete mixer and the multiple-choice test items. A research question was developed to guide the research work. From findings gotten, the improvised concrete mixer had positive effects on students' performance in concreting compared to those taught with conventional teaching methods. The researchers recommended that the state government/ministry of education should provide adequate funds to procure the materials for constructing improvised concrete mixers for teaching concreting in technical colleges in Rivers State.

Keywords: Rivers State, concrete, colleges, technical, equipment.

INTRODUCTION

The verb concreting entails covering an area with concrete. Concrete's versatility, durability, sustainability, and economy have made it the world's most widely used construction material. About four tons of concrete are produced per person per year worldwide. The term concrete refers to a mixture of aggregates, usually sand, and either gravel or crushed stone, held together by a binder of cementitious paste. The paste is typically made up of Portland cement and water and may also contain supplementary cementing materials (SCMs), such as fly ash or slag cement, and chemical admixtures.

Concrete is one of the oldest and most common construction materials in the world, mainly due to its low cost, availability, its long durability, and ability to sustain extreme weather environments. The oldest concrete discovered dates from around 7000 BC. It was found in 1985 when a concrete floor was uncovered during the construction of a road at Yiftah El in Galilee, Israel. It consisted of a lime concrete, made from burning limestone to produce quicklime, which when mixed with water and stone, hardened to form concrete (Brown, 1996; Auburn, 2000).

The worldwide production of concrete is 10 times that of steel by tonnage. Concrete is a heterogeneous mixture that consists of the following components: Aggregate: forms about 75% of the concrete volume. Aggregates can be sand or crushed rock or recycled concrete rubbles, or other materials. Cement: comprises about 7-14 % of concrete. The purpose of cement is to bind the concrete. Water: The higher the content of water in concrete, the higher the concrete workability, as water makes the concrete thinner.

When water is added to concrete, it results in concrete hydration reaction, and hardening subsequently. Additives: many additives are used to increase concrete workability. They are added in ratios that do not exceed 2% of cement content, usually 1- 2%.

A Concrete mixer is a machine that combines cement evenly to form aggregates such as sand or gravel and water to concrete. A typical concrete mixer uses a rotating drum for mixing the components. For smaller volume works portable concrete mixers are regularly used for concrete, can be produced at the site, so that workers have enough time to use the concrete before it hardens time.

Technical colleges are regarded as one of the principal Technical Vocational Education and Training (TVET) institution in Nigeria for the training of craftsmen in trades such as concreting. 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. 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 (Dokubo, 2015).

According to National Board for Technical Education National Vocational Certificate (NVC) Curriculum and Course Specifications in Block-Laying and Concreting (2007), Concreting operations involve:

1. Mix proportions (Cement - aggregate ratio; water-cement ratio).
2. Stages in concreting (Batching, mixing, transporting, placing, curing).
3. Methods of transporting wet concrete.

According to Ogondu & Wordu (2014), most teaching methods of technical colleges are not adequately building on practical manipulative skills but rather end up theorizing practical subjects; thus ignoring the ancient Chinese proverb that says “You tell me, I forget; show me I remember; involve me, I understand”. Technical education being a competency-based education should be taught with a focus on practical skills acquisition generally made possible through constant practice on the job related skills not only on theories. Hence, the development of an improvised concrete mixer is vital to bridge the gap between theory and practical; thus filling the void created by lack of modern standard concrete mixing machines in technical colleges in Rivers State.

The researchers followed the following steps:

- (1) The National Business and Technical Examination Board Syllabus in Block/brick laying and concreting were carefully analyzed to determine which aspects of the syllabus that required the use of concrete mixer in teaching.
- (2) The specific tasks requiring the improvised concrete mixer were identified.
- (3) In collaborating with the technical colleges teachers and workshop personnel, the design for the improvised mixer was drafted, materials sourced and the mixer fabricated.

Statement of Problem

Concreting ought to be taught using the same equipment students will be exposed to in the world of work after graduation. Technical colleges in Rivers State lack the needed modern equipment for teaching building-related courses (Dokubo, 2011). The results obtained National Business and Technical Examination shows poor performance by students in concreting. Lack of functional concrete mixer may have contributed to the students’ poor exposure to practical classes. Conventional teaching aids such as drawings, pictures and non functional archaic mixer used in the Technical Colleges for teaching block/brick laying and concreting are only descriptive and cannot be used to teach practicals. For this reason, local construction of a functional concrete mixer is imperative. Hence the research was undertaken to find out the effect of improvised concrete mixer on students’ performance in concreting in technical colleges in Rivers State.

Research Question

One research question guided the research:

- 1) What is the effect of using an improvised concrete mixer on students’ performance in concreting in technical colleges in Rivers State?

METHODOLOGY

This study adopted research and development (R and D) design incorporating quasi-experimental research design. Quasi- experimental design involved the use of pre-test and post-test design with experimental and control groups. This design implies that intact classes were used for the study. This design was necessary because it was not possible for the researchers to randomly sample the students and assign them to groups without disrupting the normal academic programme of the Technical Colleges involved in the study (Akaninwor, 2005, Ali, 1996). The experimental groups were treated with an improvised concrete mixer while the control groups were treated with pictorial aids showing the sequence/operational procedures of mixers (called conventional teaching aid in this work).

Population and Sample

The population of the study comprised 60 final year students of the three Technical Colleges offering block/brick laying and concreting, namely GTC Port Harcourt, GTC Ahoada and GTC Tombia. There was no sampling as the population of 60 students was used for the study, 20 students in each college. However, selection of the students into the experimental and control groups was carried out using the simple random sampling techniques. 10 students in each college were in the experimental group, while the other 10 in the control group.

Instrument for Data Collection

The instrument for data collection was the Concreting Achievement Test (CAT) developed by the researchers. 38 test items were identified and selected from the content of block/brick laying and concreting syllabus/curriculum. The researchers in constructing CAT, prepared a table of specification/test blue print to guide the development of the test items.

RESULTS

Research Question 1: *What is the effect of using an improvised concrete mixer on students' performance in concreting in technical colleges in Rivers State?*

Table 1. Mean Score on effect of using improvised concrete mixer on students' performance in concreting in technical colleges in Rivers State

Group	Pre-test mean	Post-test mean	Mean gain
Experimental	18.51	44.65	13.71
Control	19.26	27.41	

The data presented in Table 1 show that students in the experimental group have a pre-test mean score of 18.51, a post test mean score of 44.65. While students in the control group have a pre-test mean score of 19.26, a post test mean score of 27.41. The mean gain was 13.71. The effect here was that those taught concreting using the improvised concrete mixer performed better than those taught with conventional teaching aids.

DISCUSSION OF FINDINGS

The findings of this study revealed the effect of using an improvised concrete mixer on students' performance in concreting in technical colleges in Rivers State. This positive improvement noted is in line with Dokubo (2011), who opined that machines and equipment are pivotal in enhancing students' performance in the field of technical and vocational education. Furthermore, as noted in Mbadi (2007), exposing students to the right tools and materials needed for their chosen field helps them assimilate points taught better and serves as a strong motivation for them to learn.

CONCLUSION

The purpose of this research was to determine the performance of students in concreting taught with an improvised concrete mixer in technical colleges in Rivers State. The study revealed that there was significant difference in the mean performances of students taught concreting using the improvised concrete mixer and those taught using conventional teaching aids.

RECOMMENDATIONS

Based on the findings of the study, the researchers recommend that:

1. Rivers state government/ministry of education should provide adequate funds to procure the materials needed for constructing improvised concrete mixers for teaching concreting in technical colleges in Rivers State.
2. Heads of technical colleges should liaise with private construction firms and regularly take students offering building related trades to construction sites to see and physically experiment with various machines and equipment.

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