MATHEMATICAL CONCEPT OF AREA; A TOOL FOR MATHEMATICAL QUANTIFICATION AND ESTIMATION

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ABSTRACT: *The study seeks to investigate the effect of a good knowledge of mathematical concept of area on the quantification and estimation of tiles in a building construction. To achieve the purpose of this study, one null hypothesis was formulated. An experimental design was adopted for this study. A Sample of ten (10) tillers who attained primary education was collected from a building construction site. This was divided into two groups of five (5) tillers each, the experimental group tillers taught with mathematics concept of area) and the control group (tillers taught area without mathematics concept of area). The instrument for data collection was workers ability on quantification and estimation test (WAQET), with reliability index of 0.87. The hypothesis was tested using the independent t-test analysis at p>O.O5 level of sigi4flcance, the result showed a mean score of (10. 09) of the experimental group which was higher than the mean score of (8.02) for the control group. The analysis reveals that tillers who had a good knowledge of mathematical concept of area were better in quantification and estimation of tiles.*

KEYWORDS: Mathematics, Quantification, Estimation, Area, Construction

INTRODUCTION

Recent economic trend in Nigeria calls for prudent spending of resources, this applies to all sectors of the economy including housing in terms of materials and quantity costing and estimation. Tiling has become part of the contemporary building component in our society, therefore its costing, procurement and laying has to be given a top consideration in everyday building process. The structural nature of tiles by its manufacturing process is found to be given in squares and rectangles depending on the dimension and the manufacturing companies. Due to its mathematically calculated shape and structure it now has mathematical implications. Thus the basic knowledge of Area becomes the prerequisite knowledge for a tiller to have before handling, fixing, estimating and costing a room under construction.

Area, as many other concepts in mathematics has experimental origins; Carey Bloster (1991) this is the measure of expanse associated with plane figures. It is a 2 dimensional analogue of the 1-demensional length and 3-dimesnsional volume. (Olowofeso. J. (2012).

On the other hand, "Quantification is an act of determining, expressing or measuring the amount and quantity of any substance or material in discourse. V.P Jaggi (Dictionary of Mathematics) meanwhile, estimation, according to Mariam Webster Dictionary is the process of guessing out the size, amount or lost of a substance or materials. The process of determining as nearly as possible the value of a population parameter by using an estimator.

However, the material in discourse is the square tile of a fixed dimension. Therefore, the area of a square which is an assume size and structure of most commonly used tiles is given as Area

= Width X height (since the width and height are by definition the same; the formular can be rewritten as Area = S^2 (where s represent the size of any side). The area of a flat surface of a room to the number of unit squares that can be contained within it. The unit square is usually some standard unit like a square foot or a square inch. So, if you are trying to find the area of a floor that is 9 inches by 11 inches and the unit square required is the square inch. Then, there are 9 x 11 = 99 square inches in that floor.

Relating the area of a square floor of certain dimension with tiles, in a given length of a floor the accurate estimate of tiles could be related given the formular.
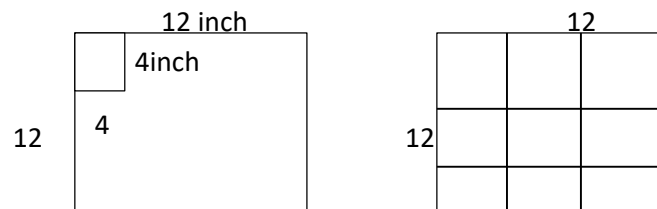
$$\frac{L}{x} = n \Rightarrow n^2$$

Where

L	=	length of the room
x	=	length of the tiles
n	=	no of tiles per unit length
n^2	=	total no of tile needed in the square room

(kaplam (1998) Mathematics Handbook)

Given a square room of 12x12 inches and a titles of 4x4 inches to be used in covering the floor. The number of tiles per unit length is given as $\frac{12}{4} = 3$ $\therefore 3^2 = 9$

In the simple analogue stated above in a 12 x 12 room using a 4x4 tiles; 9 pieces of a square tiles will accurately fit into the room. By this formular it is possible to give a good estimation and quantification of the number of cartons of tiles that could contain in any single room size, reducing the level of wrong estimation and quantification in today's building and construction industries.

Statement of problem

Mathematics has been described as a tool for national development and in this time of national growth where entrepreneurship development, skills acquisition and artistic prowess is being strongly encouraged, practical handwork has becomes the selling. Point for youth and this has gained more recognition in the national economy. Nonetheless, the knowledge of certain concept in Mathematics becomes inevitable to every sector of crept; specifically in the tilling sector. The knowledge of Mathematical concept of area becomes very important in the tilling crept to enable accurate estimation and quantification of tiles, this however would enable a prudent spending and finance. How be it,. The research seeks to investigate the extent to which

the knowledge of Mathematical concept of Area can act as a tool for accurate estimation and quantification using titles as a case study.

Purpose of the study

The purpose of this study seeks to investigate the effect of a good knowledge of mathematical concept of area on the quantification and estimation of tiles in a building construction.

Research question

In order to guide the investigation, this research question was stated thus; how a good knowledge of Mathematical concept of area does affects the quantification and estimation of tiles in a building construction.

Research hypothesis

The null hypothesis for the study is stated as follows;

Ho: Good knowledge of mathematical concept of area does not significantly affect the quantification and estimation of tiles in a building construction.

METHOD

Research Design

The experimental research design was employed in this study; the dependent variable of the study is quantification and estimation of tiles while the independent variable is the knowledge of mathematics concept of area.

Research instrument

The investigator administered a self-structured practical test questionnaire title; workers ability on quantification and estimation test (WAQET) and validated the items by giving them to experts in mathematics education for content and construct validity, the reliability of the instrument using the test-retest method, the computed reliability coefficient using the split – half method was 0.87.

Sample

Ten (10) tiles were obtained from a building construction site (Assumed to be professional tillers). Using a simple random sampling techniques they were divided into two groups of five (5) tillers each – the first group was called the experimental group; this group of tillers were given thorough instruction on the mathematical concept of Area as it applies to the context of tilling; the second group was called the controlled group; this group of tillers were taught the concept of area using the conventional lecture method. After the instruction, the investigator administered the instrument (Questionnaire test) to both groups of tillers to ascertain their level of estimation and quantification with regards to the already taught knowledge of area.

Data analysis techniques

The mean score and the standard deviation were first computed the investigator then computed the t-value of 2.01. This is found to be greater than the critical t- value of 1.860 at 0.05 significance level.

Table 1: T-test analysis showing the workers ability on quantification and estimation

Variable s	N	$\overline{X}$	S.D	T-value
Experimental groups	5	10.09	3.23	2.01*
Control group	5	8.02	2.10	

Significant at p>0.05 level, critical t-value = 1.860

RESULT

According to the above table of analysis, a good knowledge of mathematical concept of Area significantly affect the estimation and quantification of tiles.

Interpretation

The result in the table above reveals that the calculated t-value of 2.01* is greater than the critical t-value of 1.860 at 0.05 level of significance with 8 degree of freedom. With this result, the null hypothesis was rejected this means that the good knowledge of mathematical concept of Area significantly affect the estimation and quantification of tiles.

SUMMARY AND RECOMMENDATIONS

The knowledge of Area can highly influence tillers estimation and quantification. Mistakes professional tillers make when delivering quotation is partly leverage on their inadequacy in the knowledge of mathematical concept of Area. However their proficiency and accuracy could be improved by creating an avenue where artisans like tillers are properly educated and instructed on the use of mathematics area to estimate and quantify the number and cost of tiles to be used in a specific portion of the floor depending on the square dimension of such an area of the floor intended to be tiled.

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