

A MATHEMATICAL MODEL FOR EXCESS WORKLOAD ALLOWANCE IN NIGERIAN UNIVERSITIES

F. A. OGBU

(Received 22 October 1999; Revision accepted 9 May, 2000)

ABSTRACT

In this paper we present a mathematical model for the determination of excess workload allowance in a semester for an academic staff in Nigerian Universities. The model is illustrated by applying it to imaginary cases that portray likely situations that may be possible. Under the prevailing situations (salary structure) that existed in the University when the allowance was agreed upon, our results show that the model fits the fact.

Key words: Workload, Allowance, Administrative Responsibility, Mathematical Model

INTRODUCTION

The payment of Excess Workload Allowance in Nigerian Universities came into being with the Federal Government of Nigeria (FGN) - Academic Staff Union of Nigerian Universities (ASUU) Agreement signed on 3rd September, 1992. The agreement provides that "there shall be Excess Workload Allowance payable to academic staff where applicable" according to specified rates for different categories or status. In the FGN-ASUU Agreement, Excess Workload was defined as "workload over and above the normal workload (credit hours) determined by Universities in accordance with Full Time Equivalent (FTE)".

This provision in the agreement, unfortunately, has not been uniformly implemented in Universities. In some cases, non-implementation or perceived wrong implementation has been one source of dispute between ASUU and University management in some Universities. In those cases, either the academic staff claimed being under paid or the University management claimed that staff were demanding ridiculously very high allowances. University management argue that any method used in computing Excess Workload Allowance that

results in a staff getting an allowance four-five times more than his/her salary within the period of claim, is not proper and fair. This position is very reasonable. In actual fact, it is not fair for any body to claim more than twice his salary because it is not fair for any body to work more than twice what he should normally. The quality of his job will definitely decline.

Presently, there is no universally accepted formula for computing Excess Workload Allowance claim. Different Universities have used different modalities including a flat amount for all staff! This paper is aimed at reducing or eliminating such disagreement arising from subjective and biased payment by proposing a realistic model for the computation of Excess Workload Allowance. The model was first proposed to and adopted by The Federal University of Technology, Yola in 1993. Recently, three neighbouring Institutions have contacted the author and expressed their satisfaction with the model. The beauty of the model is that it is flexible and can be adapted to suit individual University's accepted parameters (Olayi and Ogbu, 2000).

THE ASSUMPTIONS OF THE MODEL

In developing the model, certain assumptions

are made. Some of these assumptions are general and some are specific as they relate to values of parameters in the model. We assume that an academic staff workload in a semester is made up of the credit units he teaches, the number of students he supervises and his administrative responsibilities. Students supervision and administrative responsibilities are not taken into consideration in the model for the following reasons.

- a. Students supervision - There is/should be a provision for payment of supervision allowance (for both undergraduate and postgraduate supervision).
- b. Administrative responsibilities - (e.g. Headship of Departments, Deanship of Schools/Faculties, etc) attract/should attract honoraria and responsibility allowances as approved.
- c. More importantly, workload arising from these can not be related to FTE as required in the definition of Excess Workload earlier defined.

Number of courses is critical to workload because of the contact hours, the number of students in each course, the number of assignments or tests given in each course which, consequently, provides the number of test/assignment scripts marked and the number of examination scripts marked. We shall assume that a β - credit unit course is taught for β hours a week. Similarly, practical/laboratory courses will be assigned their contact hours. This is in line with NUC's definition of credit unit (NUC, 1989).

For class size (number of students in a class), we shall attach suitable weights. For example, weights can be attached according to the following classifications:

Class size (S)	Weight (W)
1 - 50	1.00 (normal class size)
51 - 100	1.25
101 - 150	1.50
151 - 200	1.75
201 - 250	2.00
251 - 300	2.25
etc.	

This classification should stop at the maximum class size which can be taken as the seat capacity of the largest lecture theatre in the institution. Thereafter, division of class into groups could be allowed and each group taken as a different course. For practical courses, division should be allowed according to the department's laboratory space.

DEFINITION OF TERMS

We now define the following terms used in the model.

EWA	=	Excess Workload Allowance
N	=	N ^o of weeks in a semester
n	=	N ^o of courses taught by the staff in the semester
u _i	=	N ^o of units (credit units) for course i
w _i	=	Weight of course i
b _i	=	N ^o of academic staff that handled course i
K	=	Normal workload for an academic staff in a week. This should be different for staff with administrative responsibility and staff without administrative responsibility. For example, K may be taken as 8 for the former and 10 for the later.
e	=	Examination factor - contribution to workload due to marking of examination scripts.
t	=	Test factor - contribution to workload due to marking of assignment/test scripts. From investigation and our own experience, it is found

out that, on the average $e = 0.1$ and $t = 0.05$.

- α_i = N^2 of tests/assignments given in course i .
- S_i = N^2 of students examined in course i .
- m = N^2 of courses in which the staff examined students. Note that this is not necessarily equal to n (N^2 of courses taught by the staff).
- R = Rate per credit hour or unit

- v. The N^2 of lecture weeks in a semester, $N = 15$
- vi. There are two tests given in each course, i.e. $\alpha_i = 2$ for all i

Note: With the two earlier assumptions that $e = 0.1$ and $t = 0.05$, equation (2) becomes simply

$$EWA = \left\{ N \left[\frac{\sum_{i=1}^n u_i w_i}{b_i} - K \right] + 0.2 \sum_{i=1}^m S_i \right\} R \quad (3)$$

Hence with the further specific assumptions this simplifies to

$$EWA = \left\{ 15 \left[\frac{\sum_{i=1}^n u_i w_i}{b_i} - 8 \right] + 0.2 \sum_{i=1}^m S_i \right\} 15 \quad (4)$$

The hypothetical cases and layout tables of computations are presented below.

The results obtained from these illustrations show that student enrolment (class size) and credit units are more critical to an academic staff workload than the absolute number of courses. To avoid excessive claims or over loading of staff, Universities should set

SPECIFICATION OF THE MODEL

Using the assumptions and definitions made in the last two sections, the mathematical model for EWA being proposed here is given as

$$EWA = \left\{ N \left[\frac{\sum_{i=1}^n u_i w_i}{b_i} + \sum_{i=1}^m (e + \alpha_i t) S_i \right] - NK \right\} R \quad (1)$$

Simplifying, (1) becomes

$$EWA = \left\{ N \left[\frac{\sum_{i=1}^n u_i w_i}{b_i} - K \right] + \sum_{i=1}^m [e + \alpha_i t] S_i \right\} R \quad (2)$$

The first two terms on the right hand side (RHS) of (1) are the contributions of teaching, practical/laboratory work and examinations, respectively, to a staff's actual workload while the last term is the normal workload. Equation (2) clearly shows that a staff whose teaching workload is equal to or less than the normal workload is entitled to a claim arising from marking of tests and examination scripts. The larger the class size, the bigger the claim. $EWA \leq 0$ should be interpreted as not qualified for a claim, and $EWA < 0$ implies "underutilization" of staff.

COMPUTATIONAL EXAMPLES

We shall now illustrate the application of the model using hypothetical cases. In these cases, we further make the following specific assumptions.

- The staff is a Senior Lecturer, hence
- The rate is ₦15.00 per hour
- The staff has administrative responsibility (HOD), hence
- Normal workload $K = 8$

CASE 1
NAME OF STAFF: _____

STATUS: _____

S/N ^o	Course (u _i)	Units (u _i)	N ^o of Staff (b _i)	Class Size (S _i)	Weight (w _i)	Workload (u _i w _i /b _i)
1	ENG 101	2	1	11	1.00	2.00
2	ENG 203	2	1	40	1.00	2.00
3	ENG 305	2	1	35	1.00	2.00
4	ENG 403	3	1	52	1.25	3.75
5	ENG 103	3	1	300	2.75	8.25
				438		18.00

EWA = ₦3339.00

CASE 2

S/N ^o	Course (u _i)	Units (u _i)	N ^o of Staff (b _i)	Class Size (S _i)	Weight (w _i)	Workload (u _i w _i /b _i)
1	MAT 208	2	2	108	1.50	1.50
2	MAT 210	2	2	106	1.50	1.50
3	MAT 304	2	2	94	1.25	1.25
4	MAT 506	2	2	5	1.00	1.00
5	MAT 512	2	2	5	1.00	1.00
6	MAT 516	2	2	5	1.00	1.00
7	MAT 508	2	3	52	1.25	0.83
8	MAT 598	4	1	1	1.00	4.00
				376		12.08

EWA = ₦2046.00