Reflections on a Model for Recurrent Budget Estimates and Fund Allocations

L.S.O. Liverpool and E.I. Opara

INTRODUCTION AND CONCEPT OF THE FULL-TIME-EQUIVALENT (FTE) METHOD

University budget estimates provide for all functions within the university system. Such functions include teaching, research, administration and various other activities incidental to or arising from them. The operational budget for a university consists of functional-departmental budgets which are interrelated in preparation and independent in use. Data from one is required in the preparation of the other.

All these functions owe their origins to one common variable which is the student population: that is, students are directly or indirectly related to, and associated with, the university functional budget estimates. They form the base for budget estimates and the starting point for estimates preparation.

There is therefore the need to define student population in equitable terms. In doing so, the quantitative aspect which is the primary stage of budget preparations is rationalized. Resources and funds subsequently allocated are directed and channelled to functions where most needed. Such distribution ensures maximization in the use of economic resources of teachers, money, materials, goods and services. In the final analysis, the primary and secondary phases of the budget preparation reflect equitable plans and provisions, even though on a reduced scale, owing to income constraints.

In ascertaining student population there are the:
- head-count method, and
- full-time-equivalent (FTE) counting method.

The student head-count method, as the name implies, is the common chronological counting system. The student FTE count, on the other hand, counts students in relation to the departmental level of activities measured by the number of teacher-student contact hours within each department. There are departments with very small populations of students by head count, but where such departments offer service courses to students from other programmes or departments, they could end up with a very large student population by FTE count. An example is the typical mathematics department which offers service courses to students from virtually all faculties, but has relatively few students of its own. In such cases the main estimates and funding parameters will be the FTE as it gives a better perspective of the actual number of students a department caters for, as opposed to the head count. It is used for determining staff population (Ahmed Committee Report, 1990; Liverpool, 1992) and space requirements (Liverpool, 1992).

This paper discusses alternative definitions of the FTE, some of its main characteristics, and the problems of its calculation. Examples of the implementation of the FTE formula and formulae for sharing funds are presented. The paper ends with reflections on a model for recurrent budget estimates and fund allocations.

DEFINITION OF FTE

The head count of a department or faculty is the total number of students registered for all programmes in the department. The head count does not always give a true picture of the real population of a faculty or department. In the first place, students of any given department may take courses outside it. Also students from other departments may patronize the service courses offered by the department. A more realistic parameter for determining population is, therefore, the FTE. This reflects the fact that courses may be offered to students in departments other than that in which their programme is based, and it gives credit to a department for its service courses.

Two methods of calculating the FTE are introduced here (Omoregie, 1976).

METHOD 1

This method involves the calculation of a weighting factor, A, to be multiplied by the head count:

\[
A = B + C + D
\]

where B, C and D are defined as follows:

- \( B \) = Students in own department, eg 150 of them taking the same courses for 20 periods per week.
- \( C \) = Students from other departments, eg 50 of them taking 10 hours per week.
- \( D \) = Students to other departments, eg 100, eg 100 with 2 hours weekly.

The weighting factor \( A = 1.06 \), while the number of students by head count = 150

FTE = 1.06 x 150 = 159

METHOD 2

The second method gives the FTE number of students directly. It employs the formula:

\[
FTE = \frac{k}{\sum \frac{C_i N_i}{A}}
\]

where \( C_i, N_i, A \) and \( K \) are defined as follows:

- \( C_i \) = Credit unit of the ith course.
- \( N_i \) = Head count in the ith course.
- \( A \) = Some fixed number, representing the average number of course units subscribed to the department/faculty, by its departmental/faculty full-time students.
- \( K \) = Total number of departmental courses run.

We prefer the second method of calculation as it has the follow-
ing advantages:
- It is conceptually simpler.
- Submissions from departments/faculties/units can be cross-checked, albeit after the calculations have been done and used. Therefore, it does not leave room for the overshooting of student numbers.
- Course-by-course examination results for all faculties carry the information about the credit load and number of candidates offering each course. Thus $C_j$ and $N_j$ can be certified.
- Only A has to be accepted without certification. But with the minimum load prescribed for each programme by the minimum academic standards document (NUC, 1989) the possible range of error in A is strictly limited.

It is important to note that when the FTE is calculated, the total FTE in the university should approximately be equal to the total head count. This indeed is the rationale for the National Universities Commission’s (NUC) use of the head count in the overall allocation of grants to universities, while the maximization of the use of such grants rests with equitable internal distribution policies/formulae within universities. This is facilitated by the use of the FTE population count as a basis of budget estimates and allocation of funds. As FTE counts are approximately equal to the head count, the latter can replace the former in any situation where students take all their courses in their departments/units, and the department offers no service courses. This is the case for some postgraduate programmes in some faculties.

### CALCULATION OF FTE STUDENT POPULATION

In the implementation of the formula given in Method 2, it is expedient to calculate the FTE by level. Thus, in a four-year degree programme, the FTE at 100 level is calculated using all 100 level courses and the average credit load of all 100 level students in the department. The sum of the FTEs at the four levels then gives the undergraduate FTE of the department. The sum of the undergraduate FTEs of the faculty and the sum of the undergraduate FTEs of all the faculties and other teaching units gives the undergraduate FTE of the university. The postgraduate FTE can be similarly calculated. In most faculties and under the current National Universities Council (NUC) guidelines on minimum academic standards, credit units are specified and readily available for each course. However, for the clinical departments in the faculty of medical sciences where ‘the course system and grade point average’ (NUC, 1989) are not yet in use, this is not currently the case. The credit unit ($C_j$) has to be calculated. Presented below are:

- an illustration of the use of Method 2 in the calculation of the FTE in a faculty other than the faculty of medical sciences, and
- an illustration of the use of Method 2 in the calculation of FTE in one department in the faculty of medical sciences, clearly indicating how the credit unit ($C_j$) is calculated when it is not specified or readily available. This illustration provides a method of calculation of the FTE also in situations where the course system is not in use.

#### Calculation of undergraduate FTE in the faculty of natural sciences

The faculty has six departments and the FTE of the faculty is the sum of the six departmental FTEs. All departments run four-year programmes and the undergraduate FTE for a department is the sum of the FTEs at each of the four levels of the programme.

The department of mathematics offers 15 courses at 200 level. These are listed below with their corresponding credit load $C_j$ and population $N_j$. The product $C_j N_j$ is given in the third column and the sum:

$$\sum_{i=1}^{15} C_j N_j$$

is shown. The departmental submission for average credit load of 200 level mathematics students is supplied as 38, ie $A_2$, and the 200 level FTE of 128 is calculated as the quotient of:

$$\frac{\sum_{i=1}^{15} C_j N_j}{A_2}$$

as in Table 1.

<table>
<thead>
<tr>
<th>COURSE</th>
<th>$C_j$</th>
<th>$N_j$</th>
<th>$C_j N_j$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics</td>
<td>201</td>
<td>3</td>
<td>191</td>
</tr>
<tr>
<td></td>
<td>202</td>
<td>3</td>
<td>152</td>
</tr>
<tr>
<td></td>
<td>203</td>
<td>3</td>
<td>125</td>
</tr>
<tr>
<td></td>
<td>204</td>
<td>2</td>
<td>345</td>
</tr>
<tr>
<td></td>
<td>205</td>
<td>2</td>
<td>243</td>
</tr>
<tr>
<td></td>
<td>207</td>
<td>3</td>
<td>161</td>
</tr>
<tr>
<td></td>
<td>209</td>
<td>3</td>
<td>76</td>
</tr>
<tr>
<td></td>
<td>210</td>
<td>3</td>
<td>57</td>
</tr>
<tr>
<td>Statistics</td>
<td>211</td>
<td>4</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>231</td>
<td>4</td>
<td>77</td>
</tr>
<tr>
<td></td>
<td>232</td>
<td>2</td>
<td>39</td>
</tr>
<tr>
<td>Computer Science</td>
<td>201</td>
<td>4</td>
<td>161</td>
</tr>
<tr>
<td></td>
<td>203</td>
<td>2</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>207</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Mathematics</td>
<td>261</td>
<td>2</td>
<td>11</td>
</tr>
</tbody>
</table>

#### Table 1: Department of mathematics 200 level FTE calculation


Average credit load for students in the 200 level = $A_2 = 38$

$$\frac{\sum_{i=1}^{15} C_j}{A_2}$$

$$= FTE \text{ for 200 level}$$

$$= 4864$$

$$= 38$$

$$= 128$$

The FTE at 100, 300 and 400 levels are similarly calculated. The results give the undergraduate FTE of the department as shown in Table 2.

<table>
<thead>
<tr>
<th>LEVEL</th>
<th>FTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>221</td>
</tr>
<tr>
<td>200</td>
<td>128</td>
</tr>
<tr>
<td>300</td>
<td>56</td>
</tr>
<tr>
<td>400</td>
<td>39</td>
</tr>
<tr>
<td>TOTAL</td>
<td>444</td>
</tr>
</tbody>
</table>

As shown in Table 3, the head count of the department is 173. Thus, although only 173 students are registered for the mathematics degree of the university, the department has an FTE of 444, which means that is has, in effect, 444 students. The reason