

TECHNIQUES OF DATA PRESENTATION, INTERPRETATION AND ANALYSIS

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Introduction

In the management of educational institutions at all levels, effective record keeping is very essential. This is more so at the primary school level which is the foundation of other levels. Keeping records is not an end in itself, rather it is a means to an end. The end is to generate or procure relevant data to be processed into information on which effective administrative decisions are based. In this information age, effective management of information, using manual and computerized techniques, is a necessity. Effective Management Information System (MIS) ensures adequate capture, processing, storing, retrieving and communicating relevant and timely information to school personnel and the general public on which action for the current and future developmental activities could be based. This paper is focused on the techniques of presenting otherwise unwieldy and cumbersome data in concise and meaningful forms, for proper interpretation and analysis of the existing situation.

From the forgoing, it is obvious that data and information differ. Data refer to raw, unprocessed facts or uninterpreted observation, which may take the form of words, numbers or characters. The singular form of data is datum. Information on the other hand, refers to processed or analyzed data that meaningfully inform the recipient about a situation and as such empowers efficient action (Alabi, 1999). There is therefore the need to process data into information and present the information in a form that can be easily understood and utilized.

Data Presentation Techniques

Data can be summarized and presented in various forms. These include the following:

1. Tabulation

This deals with presentation of data in tabular form. A table is an array of data in rows and columns (Adedayo, 2000) Tabulation condenses a large mass of data and brings out the distinct pattern in a data in an attractive form. It enables comparison to be made easily among classes of data and takes up less space than data presented in narrative form.

A table has the following contents:

- a) A title at the top describing the content of the table
- b) The caption- column heading
- c) The stubs- row headings
- d) Footnote- a brief explanatory information about the table, which is not self-evident
- e) Units of measurement
- f) The source at the bottom, may sometimes be the footnote.

Data on pupil enrolment and number of teachers in a school or group of schools can be succinctly displayed in a table as in Table 1.

Table 1: Teacher Pupil Ratio in Five LGAs in Kwara State

LGA	Pupil Enrolment	No of Teachers	Pupil-Teacher Ratio
Ilorin - E	74,860	1,500	50 : 1
Ilorin – S	66,930	1,320	51 : 1
Ilorin – W	99,001	1,760	56 : 1
Ifelodun	44,600	1,050	42 : 1
Baruten	26,550	890	30 : 1

Source: Field work (Hypothetical)

Note: Another very important ratio (stock statistics) is the enrolment ratio. It refers to the relationship between enrolment at a particular level of education (e.g primary education) and the population which should be enrolled at that level (Durosaro, 1997). The enrolment could be gross or net.

A particular type of table for analyzing data on school personnel is called Frequency Distribution Table. It shows the number of times each datum occurs.

E.g scores of 20 pupils in a Mathematics test are given as follows:

11, 12, 7, 17, 12, 10, 12, 10, 11, 16,
17, 12, 12, 11, 15, 12, 10, 12, 13, 12

Table 2: Frequency Distribution Table of Pupils' scores in Mathematics Test

Score x	Tally	Frequency (f)
7	1	1
10	111	3
11	111	3
12	1111 1111	8
13	1	1
15	1	1
16	1	1
17	11	2
		20

2. Diagrammatic representation

For better visual impact, data can be represented in form of:

- Pictogram
- Pie Chart
- Bar Chart
- Histogram
- Line graph

a) Pictogram

A pictogram (short for picture diagram) presents a pictorial symbol that represents the data of interests. For instance, if the data is on pupil enrolment or staff strength, the pictogram will contain diagram of human beings. The number of diagrams drawn is usually proportional to the given data. In addition, a key is usually given on the value of each pictorial symbol. The data are usually presented in artistic and appealing form to the users.

For example, the following hypothetical data on primary schools in Kwara State can be represented in pictograms.

Key – each figure represents 20,000 pupils

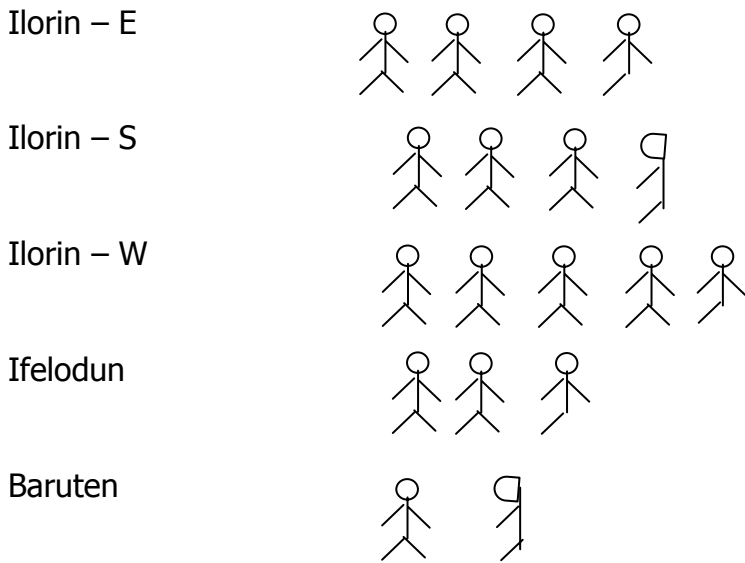


Fig. 1: Pictogram of Pupil Enrolment

It can be seen at a glance that Ilorin-W has the highest number of pupils, followed by Ilorin-E, Ilorin-S, Ifelodun and lastly Baruten.

b) Pie Chart (Circle graph)

A Pie chart consists of a circle, divided into sectors, which are proportional to the data. The sum of angles in circle is 360 degrees. A total of all cases is found and the percentage of each case is found in relation to 360 degrees.

Note: Pie chart is usually for not more than five categories.

Example: Overall performances of four primary schools in Common Entrance Examinations are given below.

School A	-	95 percent	137 ⁰
School B	-	50 percent	72 ⁰
School C	-	80 percent	115 ⁰
School D	-	25 percent	36 ⁰

To represent these data in a pie chart.

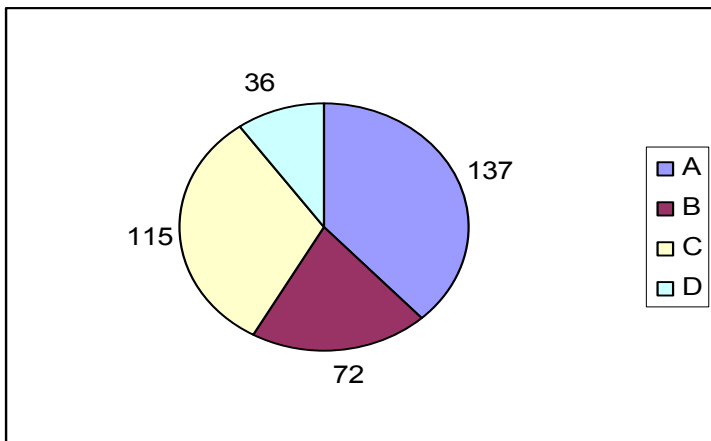


Fig. 2: Pie chart

This is a convenient way of showing the sizes of the component figures in proportion to each other and the overall total.

c) Bar Chart

Bar chart consists of separated rectangular bars drawn such that the height is equivalent to the frequency. The bars can be horizontal or vertical.

Unlike the pie chart, it is easier to make comparison of the heights than of sectors. E.g.

Example: The common entrance performance figures above can be represented using bar charts thus:

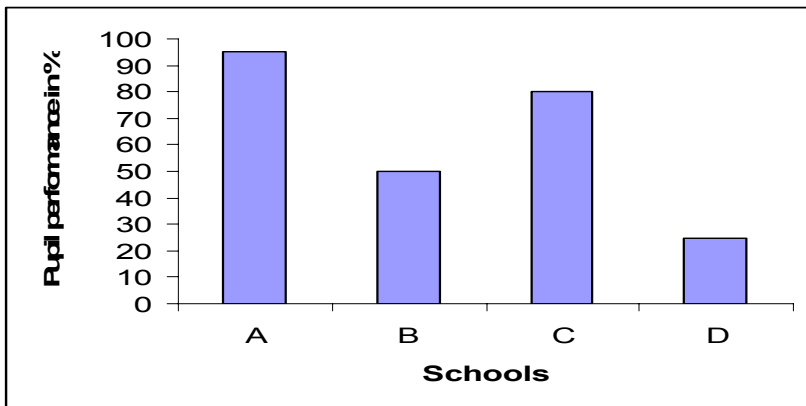


Fig. 3: Vertical Bar Chart

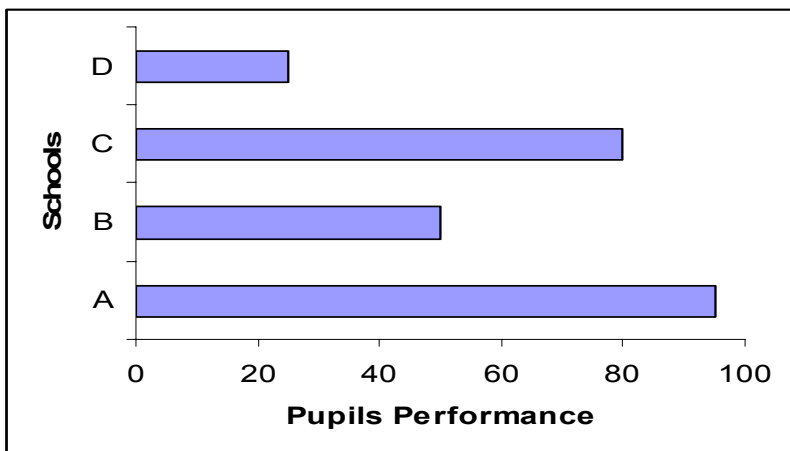


Fig. 4: Horizontal Bar Chart

d) Histogram

This is similar to the bar chart except that the bars are joined to one another. The area of each rectangular bar is proportional to its frequency. The line joining the midpoint of one bar to the other is referred to as the frequency polygon.

e) Line Graph

Data can also be represented in the form of line graph. The points on the line, represented by any symbol (., *, o) indicate the occurrence of the phenomenon of interest.

The data on overall performance of four primary schools can be plotted thus:

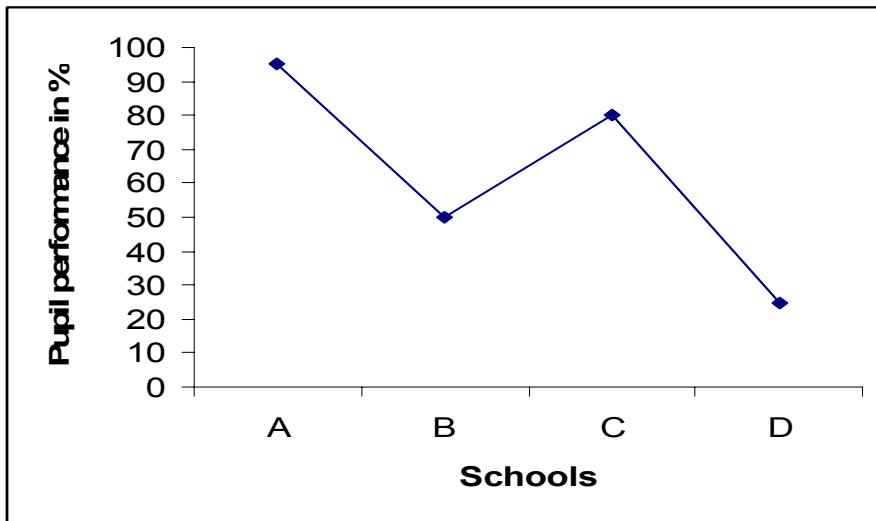


Fig. 5: Line graph

It is clear from figure 5 that school A has the highest performance, followed by school C, B and lastly D.

There are other methods of presenting data in catchy and meaningful forms. One of these methods is the use of class indicators usually on the chalk board. Brief information about the class teacher and the pupils can be displayed.

Class Indicator

Class:	Primary 1B
Name of Class Teacher:	Mrs Ojo, A.S
File Number:	KW000105
Qualification:	NCE
Total No of pupils:	49
No of Boys:	20
No of Girls:	29

Data Analysis and Interpretation

Data collected on school personnel (pupils, teachers and non-teaching staff) are summarized and analysed to generate information for taking actions on academic and administrative matters.

Methods of data analysis used in the schools include:

1. The Percentage
2. The Arithmetic Mean
3. The Mode
4. The Median
5. Rank Ordering

These methods are descriptive in nature

1. The Percentage

This refers to the proportion or rate of a particular value in relation to 100. It is used to convert values to a uniform standard for ease of comparison. The percentage is very useful in scoring and measuring pupils' performance in school subjects. It is also useful in getting the proportion of different characteristics of a variable for example sex (male/female), percentage attendance of pupils per term and session, which should form the basis of pupils' assessment on punctuality, reflected in the affective domain of the report sheets.

Each component is expressed as a proportion of the total and multiplied by 100

$$\text{i. e } \frac{x}{n} \times 100$$

Where x = particular data (E.g. score)

n = total no. of data / cases.

One other very important use of percentages is in the calculation of rates in flow statistics. Such rates include promotion, repetition, drop-out, wastage, retention and graduation rates.

Promotion Rate

This refers to the number of pupils promoted to a subsequent grade as a percentage of the number enrolled in the previous grade the previous year.

Repetition Rate

This indicates the number of pupils who repeat a grade in the succeeding year as a percentage of the original enrolment in the same grade.

Drop-out Rate

This refers to the number of pupils who withdraw from the system as a percentage of the others in the class.

Graduation Rate

This is the percentage of the students enrolled in the final grade of the level that finally leave the system on completion of the course.

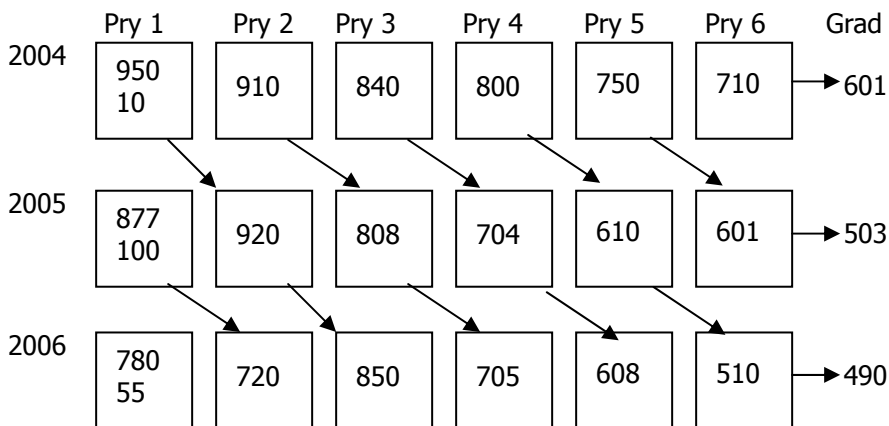
Wastage Rate

Wastage refers to the number of pupils who drop out of the system before certification and those who repeat classes, thereby rendering the resources expended on them a waste.

Retention Rate

This is the proportion of students (or teachers) retained in the school as a percentage of the original enrolment (i. e promoters and repeaters)

In the data presented below, each box represents a class. The upper data represent the enrolment while the lower data represent repeaters.



To calculate rates for 2005 between primaries 1 and 2

1. Promotion rate from Pry 1 to 2 in 2005

$$\frac{720}{977} \times 100 = 82.09\%$$

2. Repetition Rate

$$\frac{55}{877} \times 100 = 6.27\%$$

3. Drop-out Rate

$$\frac{877 - (720 + 55)}{877} \times 100 = 11.63\%$$

The three rates totaled 100%

4. Retention Rate

$$\frac{720 + 55}{877} \times 100 = 88.37\%$$

5. Graduation Rate for 2005

$$\frac{503}{601} \times \frac{100}{100} = 83.69\%$$

These rates are useful in the measure of the level of effectiveness and efficiency of the system. Problem areas could be identified and measures put up towards solutions.

2. The Mean

This is the arithmetic average of a set of data (e.g scores). It is obtained by summing up all the scores and dividing by the total number of cases.

$$\text{Mean, } \bar{x} = \frac{\sum X}{N} \text{ OR } \frac{\sum X}{\sum f}$$

Where \sum = Summation
 X = Score
 N = Number of Cases
 f = frequency

Examples

- (1) Considering the following scores of primary 2 pupils in a Yoruba Test.
 18, 12, 9, 6, 5, 3, 3, 3

$$\text{The mean} = \frac{59}{8} = 7.37$$

The mean provides important information such as average performance of pupils in a particular subject. This could form the basis for self-assessment of the subject teacher(s) and the teaching methodology. In addition the mean, representing equal sharing among all values in a data set, is the base from which many others important measures are computed.

3. The Median

This is the middle value in a set of values, dividing the data into equal parts. It is a measure of position rather than of magnitude. The scores are first arranged in the order of magnitude (ascending or descending). If the number of items is odd, the median is the single score in the middle. But with even scores, it is the average of the two scores in the middle.

Using the scores on Yoruba test

18, 12, 9, 6, 5, 3, 3, 3

Rearranging in order of magnitude

3, 3, 3, 5, 6, 9, 12, 18

$$\frac{5 + 6}{2} = 5.5$$

4. The Mode

It is the most frequently occurring value in a set of observations. A distribution may be unimodal, bimodal, trimodal or multimodal (i.e 1, 2, 3 and many modes, respectively)

Using the scores on Yoruba test given earlier, the mode is 3.

5. Rank Ordering

Ranking involves assigning integral numbers (1, 2, 3 ---) to variables in order of importance. Though ranking can be in ascending or descending order, it is usually in ascending order in schools, from the best student to the least in a set of scores. For instance, in each subject, pupils' scores should be ranked to indicate position- 1st, 2nd, 3rd ----- to nth . In addition to giving the raw score of a particular pupil, ranking would give the relative performance of the pupil in relation to others in the class. Indicating the keenness of competition in the class, the position might serve as an impetus for serious-minded pupils to strive to maintain the lead, and or improve on their performance.

Conclusion

The knowledge of data collection procedures is important to head teachers and teachers in the Primary Schools. Equally, if not more importantly however, is adequate knowledge in the techniques for presentation, analysis and interpretation of the collected data to take effective academic and administrative decisions.

It has therefore become imperative for head teachers and teachers to acquaint themselves with data organization and analysis procedures to convert raw, hitherto meaningless data to useful information. Such information could then be used as a basis for improving the existing conditions in the schools. Towards this and, it is suggested that workshops are regularly organised to update primary schools teachers on techniques of data management using both manual and computerized methods. Efforts should therefore be intensified by the government and other stakeholders in education to train primary school heads and teacher in computer use. This would go a long way in ensuring effectiveness and efficiency in the administration of the schools.

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