PRACTICAL DEMONSTRATION ON DATA COLLECTION, COLLATION AND ANALYSIS FOR EFFECTIVE DECISION MAKING

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Introduction

The major aim of teaching in is to develop a child to improve the capacity and performance of schools. It is recognized that both the school head and the teachers carry prime responsibility for creating an effective learning environment. The society is always interested in finding out how well are the teachers teaching and how well are the pupils learning while the school is interested in

a. What are educational goals the school seeks to attain?
b. What materials are significant in teaching?
c. How to present materials for teaching before students?
d. Are the educational goals being achieved?

Through prepared tests, examinations and guidance, certain kinds of information provide an intelligent basis for applying the philosophy of education in making decisions about the objectives. Without the necessary data, many school heads and teachers are overwhelmed by the task. According to Akanbi (1999), school heads and teachers are always interested about

1. Sources which can be used in getting information that will be helpful for teaching and learning.
2. Finding out the kinds of interest pupils have.
3. Problems encountered by students in the course of learning.
4. Purposes those students have in mind for coming to school.
5. Accumulated knowledge to impart on the child
6. Basic values in life to be imparted on pupils, attitudes and skills for example, a school is interested in methods of social investigations in studying the learners needs and interests.

Data collection, analysis and application are useful in showing gaps and opportunities which can be very relevant to setting up educational objectives.

Data

This is the plural form of datum. Datum is a piece of information either written, spoken, stored or symbolized that a teacher or researcher used as a basis of making references or inferences in the process of investigation. Data are the information collected in the process of investigation. They may be numerical or non-numerical. Numerical data consists of value (data) that can be quantified, for example, the number of pupils in a class, number of students offering a subject. The non-numerical data can not be quantified, for instance, sex, state of origin, socio-economic status and so on.

Education data are the numerical information gathered about the operations of the education system. Durosaro noted that data are essential tools for educational decision-making. Education data simply refers to numerical measures of educational phenomena at any point in time. The phenomena could relate to either human or material element of the input, process or output of education.

Education data collection is the process of gathering the various quantitative information about the educational system for the purpose of using such data to guide decision making. Education data analysis is the process of collating, presentation and interpreting the information contained in the data to aid decision making. Education data storage refers to the process of preservation of data collected in such a manner that will enable us retrieve such data when needed in future for use in decision making.

Data Presentation Techniques

Data can be arranged in a descending order or in an ascending order. For example, the height of students in the class can be used to arrange the students either in an ascending order. Students performance can also be in an ascending order or the descending order.

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

Tables

This deals with presentation of data in tabular form. A table is an orderly arrangement of data showing the relationship between variables. A table contains rows and columns (Tawiah, 2000)

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 heading
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.

Example

Data on pupil enrolment and no 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)

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

E.g Ages of 20 pupils in a class 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 of Pupils Age in a Class

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

Importance of a table

1. It reveals to us at a glance the information that is being conveyed.
2. It is used to interpret data.
3. The data in the table can be used to forecast the future.
4. Quick decision can be taken using the data in the table.

Charts

A Chart is a graphical or diagrammatic presentation of data. A chart can be represented in form of:

a) Pictogram
b) Pie Chart
c) Bar Chart
d) Histogram
e) Line graph

Pictogram

A pictogram (short for picture diagrams) 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.

Example

The following hypothetical data on primary schools in Kwara State can be represented in pictograms.

Key – each figure represents 20,000 pupils

Ilorin – E

Ilorin – S

Ilorin – W

Ifelodun

Baruten

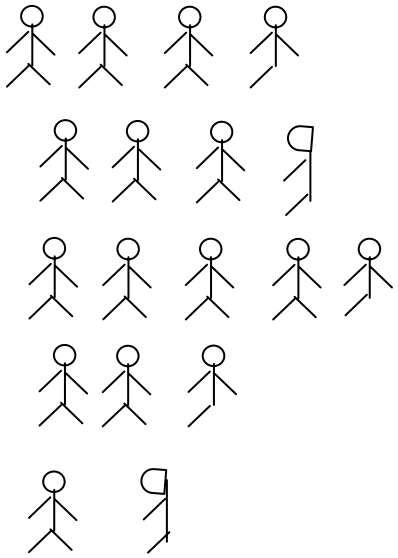


Fig. 1: Pictogram of Pupil Enrolment

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.

Pie Chart

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

Example

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

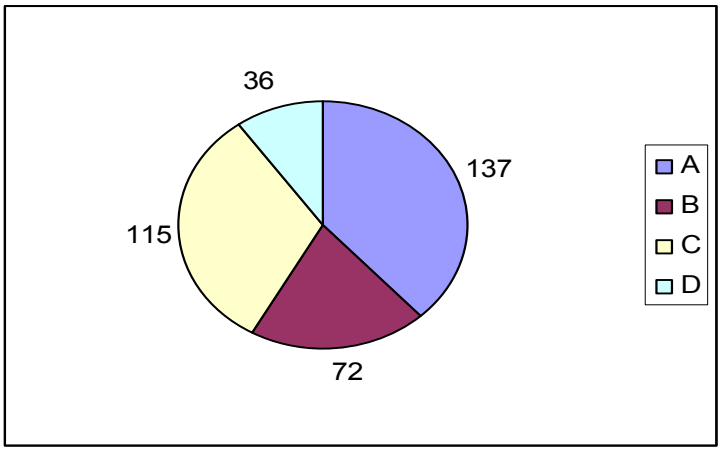
To construct a pie chart, we relate the total value or figure to 360degree and its component parts will be proportional in value to the angle subtended at the circle. The radius of the circle is proportional to the total value and is the square root of the total value

Pie chart (circle graph)

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.



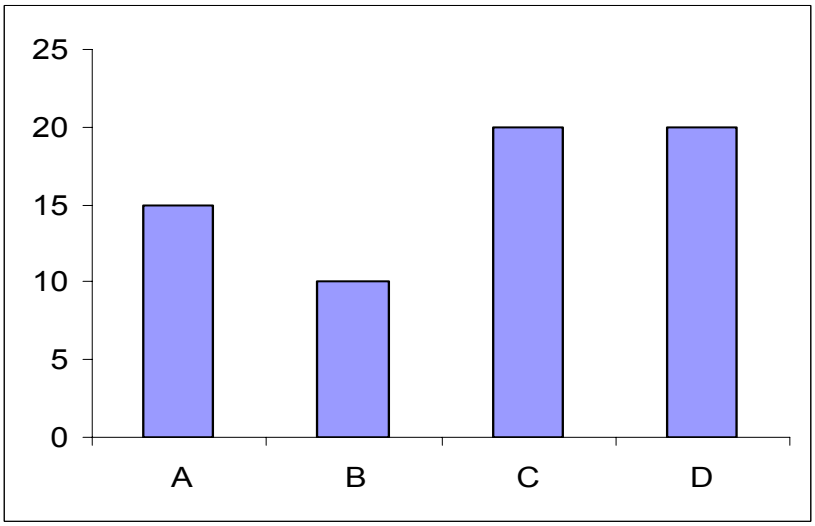
This is a convenient way of showing the series of the component figures in proportion to each other and the overall total.

b) Bar Chart

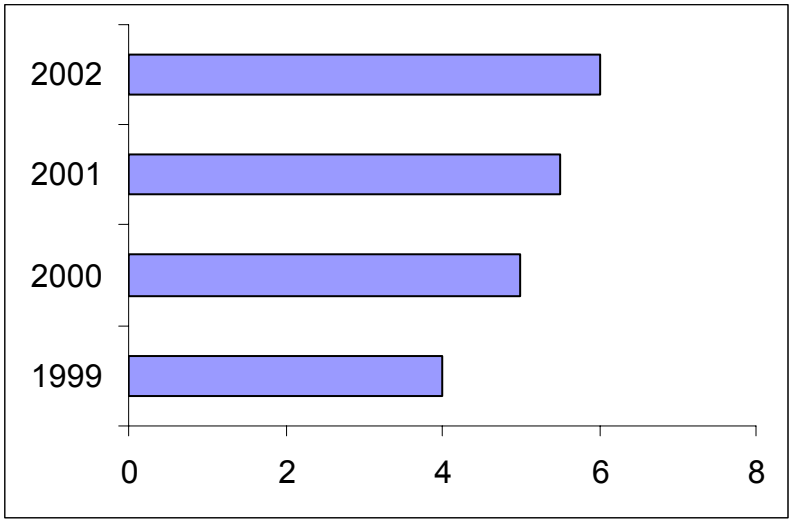
Bar chart is a series of rectangles whose heights are drawn proportionally to the values that are being represented. The bars can be horizontal or vertical. The heights of the bars should be drawn to scale to show the relative measurements, while the width of the bar rectangle should be of any convenient size, but all the bars must have the same width. Bar chart can be in horizontal or vertical form.

Example

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



Vertical Bar Chart



Horizontal Bar Chart

There are three types of bar chart, namely, simple bar chart, component bar chart and multiple bar chart.

How to construct a simple bar chart

Enrolment in United Primary School over four years, 1999- 2002

1999 - 400
2000 - 50
2001 - 550
2002 600

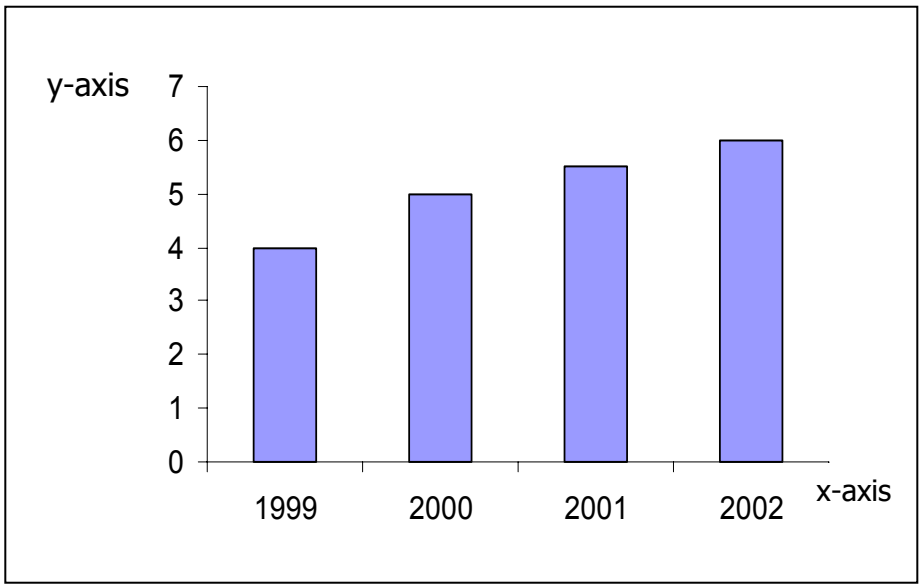
You can draw a simple bar chart to represent the data

Step 1 Write the heading of your bar chat. Here, it is
'Enrolment in United Primary School over four years, 1999- 2002'.

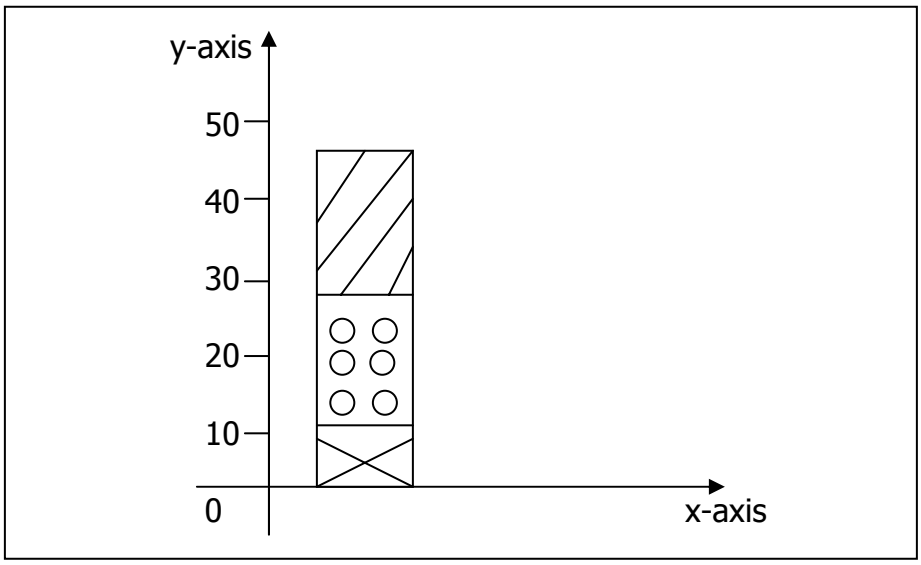
Step 2 Choose an appropriate scale which represents the data conveniently on your paper
First, Examine the enrolment, the highest is 600 and the the lowest is 600

Step 3 Draw the y-axis and the x-axis from origin 0

Step 4 Mark off 4 distance of 2cm each from the origin on the x-axis



Component bar chart



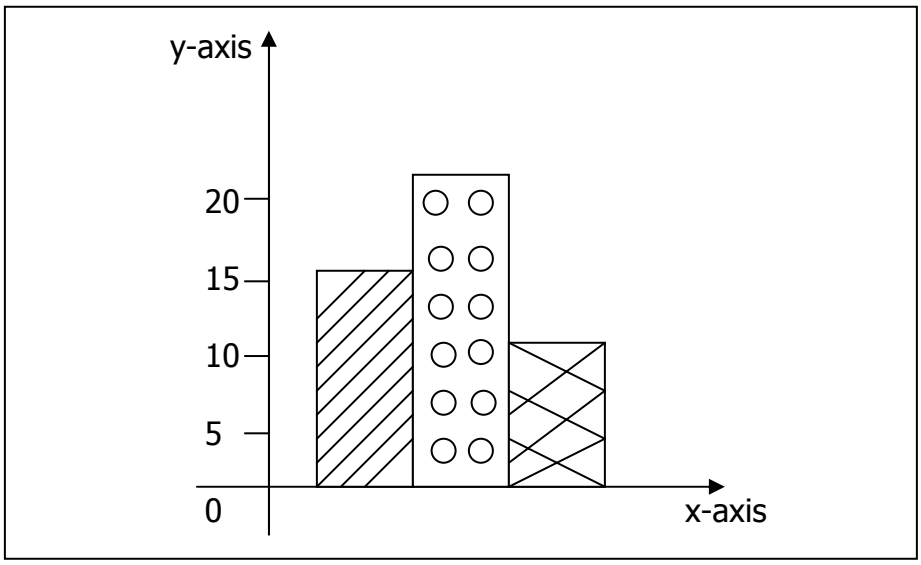
Key

Father's Contribution

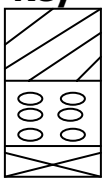
Mother's Contribution

Friend's Contribution

Multiple bar chart



Key



Father's Contribution

Mother's Contribution

Friend's Contribution

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

c) Histogram

This is a graphical representation of frequency distribution. It consists of a set of rectangle having the following characteristics.

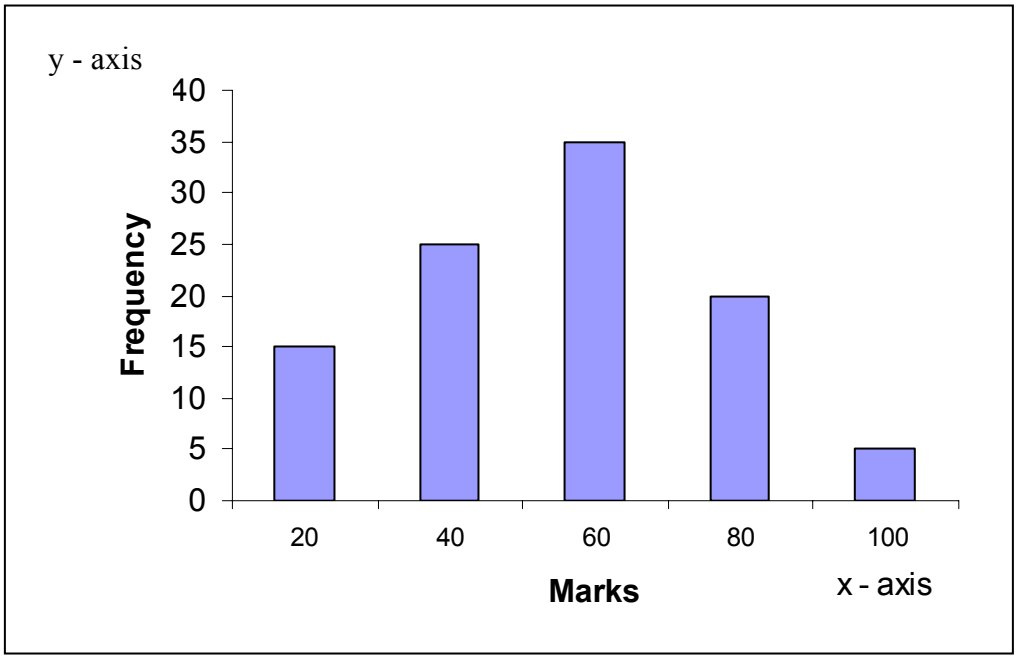
1. All the rectangles have their basis on the horizontal axis known as x-axis
2. All the rectangles have their centres on the class mark or mid point of each interval.
3. The height of each rectangle represents the magnitude of the data lying within each class interval
4. the areas of the rectangle are proportional to class frequencies

Example

The table below shows the frequency distribution, the class interval are 1- 20, 21- 40, 41- 60, 61- 80, 81- 100.

The class limit are 1&20, 21& 40, etc but1, 21, 41, 61, & 81 are the lower limit

Marks	Tally	Frequency
1-20	𝍸 𝍸 𝍸	15
21-40	𝍸 𝍸 𝍸 𝍸 𝍸	25
41-60	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸	35
61-80	𝍸 𝍸 𝍸 𝍸	20
81-100	𝍸	5



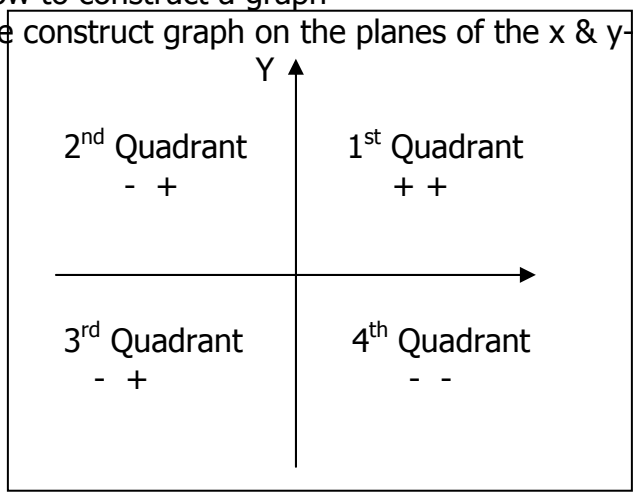
This is like a bar chart except that the bars are adjoined to one another. The area of each rectangular bar is proportional to its frequency. The line joining the midpoint of one bar to the other is referred to as the frequency polygon.

d) Linear Graph and Curve

A graph is a visual representation of the relationship between variables that change their values. Data can also be represented in the form of line graph.

How to construct a graph

We construct graph on the planes of the x & y- axes as in the following diagram



Class Indicators Other methods of presenting data in a meaningful form 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 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 valued 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' assessing punctuality in the affective domain of the report sheets.

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

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

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

n = total sum 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, and graduation rates.

Promotion Rate

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

Promotion rate from Pry 1 to 2 in 2005

$$\frac{\text{No promoted}}{\text{TN}} \times 100$$

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.

Repetition Rate

$$\frac{\text{Repeater}}{\text{TN}} \times 100$$

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.

Graduation Rate for 2005

$$\frac{GRAD}{TN} X \frac{100}{1} = 83.69\%$$

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)

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.

Measure of Central Tendency

The Mean

This is the arithmetic average of a series of value (e.g scores). It is obtained by dividing the sum of these data by the total number of elements or cases.

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

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

Example

(1) Considering the following scores of primary 2 pupils in a social studies 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 from which many others important measures are computed.

The Median

This is the middle value in a set of values, dividing the data into equal parts when the elements in the set of data is arranged in an an ascending or descending order. 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 item 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

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

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 in Yoruba test given earlier, the mode is 3.

Rank Ordering

Ranking involved assigning integral numbers (1, 2, 3 ---) to variables in order of importance. Through ranking can be in ascending or descending order, it is usually in ascending to the least in a set of scores should be ranked to indicate position- 1^{st} , 2^{nd}, 3^{rd} ---------- to nth . In addition to giving the raw score of a particular pupil, ranking would give the relative performance of the pupils 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.

Measure of Dispersion

Range, standard deviation and variance constitute measure of dispersion. The most commonly used in the primary school is the range.

Range is the difference between the lowest and the highest value in a series of figure.

Example

The range of these marks: 30, 50, 60, 85, 90, is (90 - 30) =60

References

Akanbi, T. (1999). *Records in school administration*. Ilorin: Lawani Press

Durosaro, D.O. (2004) *Statistical needs for educational management*. Ibadan: Reginasons Book Publishers.

Tawiah, K (2000). *Basic Economics for West African students*.
Lagos: Afri Educational Publishers