



NATIONAL OPEN UNIVERSITY OF NIGERIA

SCHOOL OF EDUCATION

COURSE CODE: PED 431

COURSE TITLE: CONTINUOUS ASSESSMENT IN PRIMARY SCHOOLS

PED 431

CONTINUOUS ASSESSMENT IN PRIMARY SCHOOLS

COURSE GUIDE

Course Developer: Dr. Osuji, U. S. A.
School of Education,
National Open University of Nigeria,
Victoria Island, Lagos.

Unit Writer: **Sir**, Osuji, U. S. A. Ph.D
School of Education,
National Open University of Nigeria,
Victoria Island, Lagos.

Course Editor:
Prof Christiana Omoifo
Faculty of Education
University of Benin

Programme Leader: Sir, Dr. U.S.A. Osuji
School of Education,
National Open University of Nigeria,
Victoria Island, Lagos.

Course Coordinator: Dr Lawani, A.
School of Education,
National Open University of Nigeria,
Victoria Island, Lagos.

PED 431 CONTINUOUS ASSESSMENT IN PRIMARY SCHOOLS

1.0 INTRODUCTION

This course, PED 431: Continuous Assessment in Primary Schools is designed to give you self instruction on the rudiments of continuous assessment practices and methods of analyzing continuous assessment data in the primary school system. It teaches you about the plans, implementation and activities. It is comprehensive to help you carry out your continuous assessment programmes without any encumbrances. The statistical tools which you will need to present and analyze your assessment data have been presented in a very systematic manner so that you can use them with less difficulties. The various data collection techniques have been explained. With this you can carry out your continuous assessment practices with ease.

2.0 COURSE AIMS

The aim of this course is to acquaint you with the basics in the assessment and handling of assessment records in the primary school system. It also aims at encouraging you to become an agent of change and innovations in the continuous assessment processes in order to impart the necessary knowledge to our children.

3.0 COURSE OBJECTIVES

By the end of this course, you should be able to:

- (i) Explain the concepts of continuous assessment and its characteristics;
- (ii) Discuss the provisions of the continuous assessment in the National Policy on Education;
- (iii) Describe the skills needed by the teachers in the implementation of the continuous assessment;
- (iv) Describe tests as tools for continuous assessment;
- (v) Explain the use of other instruments in the continuous assessment programme;
- (vi) Explain the types of records kept in the continuous assessment process;
- (vii) Apply the different methods of data collection in the continuous assessment;
- (viii) Compare the different methods of data collection;
- (ix) Discuss how to keep various records in the continuous assessment process
- (x) Discuss the administration of continuous assessment at the primary schools
- (xi) Describe the problems and prospects of continuous assessment;
- (xii) Organize and present data using different methods;
- (xiii) Demonstrate proficiency in the use of some descriptive statistics employed in the continuous assessment;

4.0 WORKING THROUGH THE COURSE

This course PED 431 Continuous Assessment in Primary School expects you to do a lot of reading in order to cover the content in the course material. It implies that you should

devote much time to this course by reading through this material and getting more information from numerous texts and journals in continuous assessment and measurement and evaluation. These abound in every library and from the internet. The course material has been made easy to read and user-friendly. However, you will need to attend the tutorial sessions where your Facilitator would open your eyes to more information and the practical techniques involved. You will need to work in groups with other students in order to discuss, compare notes and thoughts and to exchange ideas and share knowledge.

5.0 COURSE MATERIALS

The National Open University of Nigeria will provide you with the following items:

- Course Guide
- Study Units
- TMA Assignment file (will be available from the web CT OLE in due course)

You are required to make use of your calculator, mathematical or drawing set, graph book and statistical tables. In addition, at the end of every unit is a list of texts for your references and for further reading. It is not compulsory for you to buy or read all of them. They are essential supplements to this course material.

6.0 STUDY UNITS

The study units in this course are as follows:

MODULE 1: CONTINUOUS ASSESSMENT: INTRODUCTION AND PUPILS' BEHAVIOUR

- Unit 1: Introduction to Continuous Assessment
- Unit 2: Continuous Assessment of Cognitive Domain
- Unit 3: Affective and Psychomotor Domain

MODEL 2: CONTINUOUS ASSESSMENT INSTRUMENTS AND TECHNIQUES

- Unit 1: Tests 1
- Unit 2: Tests 2
- Unit 3: Projects and Assignments
- Unit 4: Other Instruments and Techniques

MODULE 3: RECORDS, ADMINISTRATION AND PROBLEMS

- Unit 1: Record Keeping
- Unit 2: Grading, Reporting, Interpretation and Evaluation of Results
- Unit 3: Administration of the Continuous Assessment
- Unit 4: Prospects and Problems of the Continuous Assessment

MODULE 4: ANALYSING DATA FOR CONTINUOUS ASSESSMENT

- Unit 1: Organization of Data
Unit 2: Ranking of Scores
Unit 3: Measures of Central Tendency
Unit 4: Measures of Variability or Spread

7.0 ASSESSMENTS

There are two aspects to the assessment of the course: first are the tutor-marked assignments (TMA); and the end of course examination. Within each unit are self assessment exercises which are aimed at helping you check your assimilation as you proceed. Ensure that you attempt each of the exercises before finding out the expected answer from course material.

8.0 TUTOR-MARKED ASSIGNMENTS (TMAs)

This forms your continuous assessment and accounts for 30% of your total score. You are expected to answer at least four TMA's. These must be answered and submitted before you sit for the end of course examination. Your Facilitator will give you the TMA's and you must submit your responses to your centre.

9.0 FINAL EXAMINATION AND GRADING

The 'end of course examinations' would earn you 70% which would be added to your TMA score (30%). The time for this examination would be communicated to you. With this examination written successfully, you have completed your course in Continuous Assessment in Primary Schools. One believes you would apply the knowledge (new or up-graded) which you have acquired in this course in your classroom assessments.

Table 1: Course Marking Scheme

ASSESSMENT	MARKS
Assignment (TMAs) 1 – 4	Four (4) assignments, best three (3) marks of the four account at 10% each = $10 \times 3 = 30\%$
End of course examination	70% of overall course marks
Total	100% of course marks

10.0 HOW TO GET THE MOST FROM THIS COURSE

In Open and Distance Learning, the study units are specially developed and designed to replace the University Lecturer. Hence, you can work through these materials at your own pace, and at a time and place that suit you best. Visualize it as listening to a lecturer instead of reading a text.

Each of the study units follows a common format. The first item is an introduction to the subject matter of the unit, and how a particular unit is integrated with the other units and the course as a whole. Next is a set of learning objectives. These objectives let you know what you should be able to do by the time you have completed the unit. You should use these objectives to guide your study. When you have finished the unit, you must go back and check whether you have achieved the objectives. If you make a habit of doing this, you will significantly improve your chances of passing the course.

The main body of the unit guides you through the required reading from other sources. This will usually be either from your set books or from a **Reading Section**. You will be directed when you need to use a computer and guided through the tasks you must do. The purpose of the computing work is two-fold. First, it will enhance your understanding of the material in the unit. Second, it will give you practical experiences of using programmes which you could well encounter in your work outside your studies. In any event, most of the techniques you will study are applicable on computers in normal working practice, so it is important you encounter them during your studies.

Activities are interspersed throughout the units, and answers are given at the end of the units. Working through these tests will help you to achieve the objectives of the units and prepare you for the assignments and the examinations. You should do each activity as you come to it in the study unit. There are also numerous examples given in the study units, work through these when you come to them, too.

The following is a practical strategy for working through the course. If you run into any trouble, telephone your facilitator or post the questions on the Web CT OLE's discussion board. Remember that your facilitator's job is to help you. When you need help, don't hesitate to call and ask your tutorial facilitator to provide it. In summary,

- (1) Read this course guide.
- (2) Organise a study schedule. Refer to the course overview for more details. Note the time you are expected to spend on each unit and how the assignments relate to the unit. Important information e.g. details of your tutorials, and the date of the first day of the semester is available from the Web CT OLE. You need to gather together all this information in one place, such as your diary or a wall calendar. Whatever method you choose to use, you should decide on and write in your own dates for working on each unit.
- (3) Once you have created your own study schedule, do everything you can to stick to it. The major reason that students fail is that they get behind with their coursework. If you get into difficulties with your schedule, please let your facilitator know before it is too late to help.
- (4) Turn to unit 1 and read the introduction and the objectives for the unit.

- (5) Assemble the study materials. Information about what you need for a unit is given in the 'Overview' at the beginning of each unit. You will always need both the study unit you are working on and one of your set books, on your desk at the same time.
- (6) Work through the unit. The content of the unit itself has been arranged to provide a sequence for you to follow. As you work through this unit, you will be instructed to read sections from your set books or other articles. Use the unit to guide your reading.
- (7) Keep an eye on the Web CT OLE. Up-to-date of the course information will be continuously posted there.
- (8) Well before the relevant due dates (about 4 weeks before the dates) access the Assignment file on the Web CT OLE and download your next required assignment. Keep in mind that you will learn a lot by doing the assignments carefully. They have been designed to help you meet the objectives of the course and, therefore, will help you pass the examination. Submit all assignments not later than the due dates.
- (9) Review the objectives for each study unit and confirm that you have achieved them. If you feel unsure about any of the objectives, review the study material or consult your facilitator.
- (10) When you are confident that you have achieved a unit's objectives, you can then start on the next unit. Proceed unit by unit through the course and try to pace your study so that you keep yourself on schedule.
- (11) When you have submitted an assignment to your tutor for marking, do not wait for its return before starting on the next unit. Keep to your schedule. When the assignment is returned, pay particular attention to your facilitator's comments. Consult your tutor as soon as possible if you have any questions or problems.
- (12) After completing the last unit, review the course and prepare yourself for the final examination. Check that you have achieved the unit objectives and the course objectives.

11.0 TUTORS AND TUTORIALS

Your Tutor or Facilitator will mark and comment on your assignments, keep a close watch on your progress and on any difficulties you might encounter as they would provide assistance to you during the course. You must mail your tutor-marked assignments to your tutor well before the due date (at least two working days are required). They will be marked by your Tutor and returned to you as soon as possible.

Do not hesitate to contact your tutor by telephone, e-mail, or discussion board if you need help. The following might be circumstances in which you would find help necessary. Contact your Facilitator if:

- You do not understand any part of the study units or the assigned readings.
- You have difficulty with the self-tests or exercises.
- You have a question or problem with an assignment or with the grading of an assignment.

You should try your possible best to attend the tutorials. This is the only chance to have face-to-face contact with your tutor and to ask questions which are answered instantly. You can raise any problem encountered in the course of your study. To gain the maximum benefit from course tutorials, prepare a question list before attending them. You will learn a lot from participations in discussions.

12.0 SUMMARY

This course PED 431 is designed to give you some knowledge and assessment skills which would help you to undertake your continuous assessment practices as smoothly as possible. It would help you to improve your teaching techniques and thus produce pupils who have the required knowledge proficiently and effectively. After going through this course successfully you would be in a good position to pass your examination at the end of the semester and apply the knowledge and skills gained in the practice of your continuous assessment activities. Above all, you will be able to answer such questions as can be drawn from:

The concept of continuous assessment;
 Provisions and the skills needed
 Records keeping;
 Data collection technique and instruments;
 Statistical methods in continuous assessment,

We wish you success in this practically-oriented and interesting course. We hope you will transfer what you have learnt in this course to some of your other courses that are related to this, and you will bring the knowledge from these other courses to help you perform at the optimum in continuous assessment.

We also hope you would appreciate the unique role and opportunity you have to make a difference in using the knowledge derived from this course in solving educational problems within your area of specialization. Again it will help you to make a difference in the learners' acquisition of knowledge through your comprehensive assessment of the pupils. This is the main essence of studying continuous assessment as a course.

We, therefore, sincerely wish you the best as you enjoy the course. **YOU ARE BLESSED.**

COURSE DEVELOPMENT

PED 431 CONTINUOUS ASSESSMENT IN PRIMARY SCHOOLS

Course Developer: Sir, Dr. Osuji, U.S.A.
School of Education
National Open University of Nigeria
14/16 Ahmadu Bello Way
Victoria Island
Lagos.

Course Writer: Sir, U.S.A. Osuji Ph.D
School of Education
National Open University of Nigeria
14/16 Ahmadu Bello Way
Victoria Island
Lagos.

Course Editor

Programme Leader: Dr. Osuji, U.S.A.
School of Education
National Open University of Nigeria
14/16 Ahmadu Bello Way
Victoria Island
Lagos.

Course Coordinator: Dr (Mrs) A. Lawani
School of Education
National Open University of Nigeria
14/16 Ahmadu Bello Way
Victoria Island
Lagos.

MODULE I: CONTINUOUS ASSESSMENT:- INTRODUCTION AND PUPILS' BEHAVIOUR

CONTENT:

- Unit 1.0 Introduction to continuous Assessment
- Unit 2.0: Pupils Behaviour to be assessed in C.A.I
- Unit 3.0: Pupils Behaviour to be assessed in C.A.2

UNIT 1.0 INTRODUCTION TO CONTINUOUS ASSESSMENT

CONTENT

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Continuous Assessment and the National Policy on Education
 - 3.2 The concept of continuous assessment
 - 3.3 The nature of continuous assessment
 - 3.3.1 Systematic nature
 - 3.3.2 Comprehensive nature
 - 3.3.3 Cumulative nature
 - 3.3.4 Guidance –oriented nature
 - 3.4 Rationale for continuous assessment in primary school
 - 3.5 Implications of C.A. for the classroom teacher
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignment
- 7.0 References & Further Reading

1.0 Introduction

As a teacher, you would have noticed that the introduction of continuous assessment in our school system is regarded as one of the most significant innovations of the National Policy on Education. It has been used as a testing modality in many school systems adopted in many developing countries. It is the correct assessment strategy for the educational evaluation of students' achievement in teaching-learning situations in the Nigerian school system. It is also used for the evaluation of the educational system itself. In this first unit, you will learn the concept of continuous assessment and the national policy on education, its nature and the rationale for continuous assessment in the primary

school system. Before we go on, let us look at what you will achieve at the end of the unit.

2.0 Objectives

At the end of this unit, you should be able to:-

- Explain the stand of the National Policy on Education about continuous assessment in the Primary School
- Define continuous assessment
- Describe the nature of continuous assessment
- Discuss the rationale for continuous assessment in Primary School

3.0 Main Content

3.1 Continuous Assessment and the National Policy on Education. When the Nigeria Curriculum Conference was held in the year 1969, it was suggested that continuous assessment be introduced as a remedy to the undesirable effect of the one-shot examination of students learning and achievement. It was not until 1977 that a bold attempt was made to adopt it as a policy to guide evaluation strategy of students learning and achievement. It is now entrenched in the National Policy on Education 1977, revised in 1981 and 2004. Have you seen the National Policy on Education (NPE)? Look at paragraph 7, section 7.14 states in clear terms that “Educational assessment and evaluation will be liberalised by basing them in whole or in part on continuous assessment of the progress of the individual.” The policy has gone further to make elaborations of the Continuous Assessment (CA) for the various levels and cycles of our educational system. Now, let us look at the provisions of NPE as it affects us at the primary school level.

3.1.1 NPE for the Primary Education Level

Look at the NPE again, under paragraph 15 (8 and 9), it states that “Government plans that progress along the education cycle will be based on continuous overall guidance-oriented assessment by teachers and headmasters. Government will look into the possibility of abolishing the primary school leaving certificate examinations as soon as the processes for continuous assessment have been worked out and validated. Meanwhile, certification of this level of education will be based on continuous assessment and the result of the primary school leaving certificate examination.”

If you read further, under paragraph 23(2), it specified that the First School Leaving Certificate Examination will ultimately be abolished and primary school leaving certificate will be issued by the headmasters of individual schools and will be based on continuous assessment of pupils and not on the result of a single final examination.

The NPE also directed that the admission of pupils into secondary schools which was hitherto based only on the performance in the National Common Entrance should also be based on the pupils continuous assessment. As an interim measure the present system of a National Common Entrance Examination will be allowed to continue until the junior secondary system has taken off. “ In the meantime, selection for entry into the secondary schools will, as soon as possible, be improved by incorporating headmasters continuous assessment into the Common Entrance Examination results”.

What is the current practice in your state?

ACTIVITY I

Go to some primary schools very close to you. Find out

1. How they employ the C.A. in the First School Leaving Certificate.
2. How they employ the C.A. in the entrance to junior secondary school.

3.2 The Concept of Continuous Assessment

In its simplistic way, continuous assessment can be described as a systematic and regular method or technique of determining what a learner has gained from learning activities. These learning activities involve knowledge, thinking and reasoning (cognitive), character development (affective) and industry (psychomotor). The Federal Government Handbook on Continuous Assessment (1985) defines the C.A. as:

A mechanism whereby the final grading of a student in the cognitive, affective and psychomotor domains of behaviour systematically takes account of all his performances during a given period of schooling. Such an assessment involves the use of a great variety of modes of evaluation for the purpose of guiding and improving the learning and performance of the student.

In your course on measurement and evaluation, the cognitive affective and psychomotor domains of objectives were discussed in details. Now, let us just refresh your memory by saying that the cognitive domain includes knowledge, comprehension, application, analysis, synthesis, and evaluation. The affective domain also includes attitudes, feelings, emotions, interest, punctuality, attendance in class, honesty etc. It also has some hierarchical sub levels. While the psychomotor domain deals with motor-skills such as reflex movements, basic fundamental movement, physical abilities among others.

In his own description of the concept of continuous assessment, Yoloye (1984) says it is a method of evaluating the progress and achievement of students in educational institutions. It aims to get the truest possible picture of each students ability at the same time helping each student to develop his or her abilities to the fullest. It is a method whereby the final grading of students takes account in a systematic way of their whole performance during a given period of schooling. You can notice that the emphasis here, as in other descriptions is on grading. It indicates that the individual pupil would be seen and assessed in totality. It also implies that the three 'H's – Head, Heart and Hand – relating to cognitive, affective and psychomotor domains respectively, should be taken care of in the C.A. strategy. The pupil is looked at as a whole person.

Folayajo (1979), states that continuous assessment is a system of assessment which is carried out at predetermined intervals, usually coinciding with some identifiable units of instruction or levels of educational system, for the purpose of monitoring the progress or otherwise of students and the general performance of the education system. If you look at this definition very well, you will notice that it goes beyond the assessment of the students and incorporates assessment of some aspects of the educational system. It also includes the monitoring of students' learning with a view to improving their performances and helping them in the areas of deficiencies as a way of ensuring success at related to formative evaluation where by formative tests are developed and administered to the pupils after a unit of lessons, and remediations given in areas of identified difficulties before the next unit is taken up.

In his own definition, Bajah (1984), viewed continuous assessment as a continuous updating of judgment about performance in relation to specific criteria which will allow a cumulative judgment to be made about performance upon these same criteria at any time. You may wish to bring out from this definition, that certain criteria must be present before any assessment can be effectively carried out.

Ezewu and Okoye (1981), gave another description which is more comprehensive and clear. They see continuous assessment within the educational context as a systematic and objective process of determining the extent of a students' performances and all the expected changes in his behaviour from the day he enters into a course of study in a continuous and progressive manner to the end of such a course of study and a judicious accumulation of all pieces of information derived from this purpose, with a view to using them to guide and shape the student in his learning from time to time and to serve as bases for important decision about the child.

From this description of continuous assessment you can see that it is a mechanism for progressive evaluation of changes in behaviour of individual children. It is used for determining the student's level of achievement in a course of study. As a teacher, you are expected to examine periodically how far your pupils learn the subject matters presented to them in the class. The results collected from the periodic assessment will be added and used at the final decision on each child.

3.3 The Nature of Continuous Assessment

If you critically examine the various views and definitions of continuous assessment presented in the last section, you will note some characteristics which educators and evaluators have consistently emphasized. These include that C.A. is i. systematic ii. comprehensive iii. Cumulative and iv guidance-oriented. Let us look at them in details.

3.3.1 The Systematic Nature of C.A.

Continuous assessment is said to be systematic because it has a definitive programme of assessment. Thus it has an operational plan which indicates or specifies what measurements are to be made of the students' performance, the time intervals when such measurements are to be made, the results to be recorded and the specific nature of the instruments or strategies to be adopted for the measurement. Usually, these are worked out in advance. It means then that any school involved in C.A. programme must have to adopt a definite programme that should be made known to all participants especially students, teachers and even the ministry of education officials and parents who are directly involved.

3.3.2 The Comprehensive Nature of C.A.

A variety of instruments or assessment procedures are used in ascertaining the performance of the pupils. Such instruments include tests/examinations, assignments, projects, observations, questionnaires, interviews, socio-metric techniques etc. In so far as continuous

assessment looks at the total development of the pupil, it is said to be comprehensive. The cognitive, affective and psychomotor behaviours and domains are all considered and assessed. You have to note that the evaluation system before the introduction of continuous assessment system focused mainly on the cognitive domain of behaviour. Psychomotor and affective domains of behaviour were excluded.

3.3.3 The Cumulative Nature of C.A.

The specification is that there should be repeated measurement and all such measurements are taken into account in presenting a picture of a pupil at any point in time. It means therefore that any decisions to be made on any pupil at any time should also consider and take into account all previous decisions about the pupil. This implies that the final grade of any child at the end of the year or period of schooling must incorporate or integrate the data of the last assessment including in some degree all the assessment data throughout the school year or period of schooling. If you look at the NPE provision on C.A. again, you will see that it provides that assessment at the end of primary school level must reflect the cumulative nature. It was not like this in the past. In the past decisions on a pupil were based solely on a single examination.

3.3.4. The Guidance-Oriented Nature of C.A.

Every information collected on the pupils during the process of continuous assessment is made use of for further development of the pupils. A major reason why pupils are assessed within a course of study rather than waiting until the end of the school term or school year or even end of the programme, is to obtain information on the level of the pupil's achievement and then use such information, if need be, to assist the pupil's in good time before it becomes too late. One of the main values of assessment in education is that it can assist to identify areas of strengths and weaknesses in pupils performances, the teachers instructional strategies and the educational programme. The information obtained can be utilized as a sound basis for encouraging the pupils' efforts, for remediation of students' learning problems and necessary improvement of strategies and modalities of instruction.

SELF ASSESSMENT EXERCISE I

Briefly explain the four characteristics of continuous assessment.

3.4 Rationale for Continuous Assessment in the Primary School

Apart from the reason that continuous assessment has been entrenched in the NPE for the Primary School level, there are other rationale for the introduction of continuous assessment in our primary school system. Let us look at them in details.

1. Assessment as a very important part of teaching and learning process:

As a teacher, you should be involved in the final assessment of the pupil you have taught. The C.A. provides you with this important function which is integral to the teaching-learning process. This is a radical departure from the old assessment system whereby the final assessment is done through a single one-slot examination set by an external examination body or agency like the Ministry of Education. This method does not give the teacher the opportunity of participating in the final assessment of the pupils he/she has taught.

2. It gives a true picture of the pupils ability:

The final grade which a pupil makes at the end of his primary education takes into account all his performances throughout the period of schooling. This gives the true picture of the total ability of the pupil.

3. It facilitates appropriate guidance of the pupils:

C.A. provides procedures that bring about necessary guidance to the pupils in both their learning endeavour and in their preparations for careers. It also provides guidance in psychological areas to the pupils and their parents.

4. It makes teachers become innovative and creative:

The C.A. situation makes teachers become innovative, creative and exploratory in their approach to teaching. This is because teachers continuously assess the pupils, therefore they device various ways of making the assessment interesting and valuable. Again, they assess pupils' performance on innovations, interesting and valuable topics introduced in their teaching. This forms part of the final grade of the pupils at the end of the primary school education.

5. It helps teachers to assess their own teaching:

From time to time, teachers use the continuous assessment to assess their own teaching strategies. This will help them to improve on their performance

6. It helps to reduce examination malpractices:

If after several years of work, one slot examination which is seen as very crucial is used to decide the fate of the future of the pupils, the temptation to pass by any means, fair or foul will be very high. This temptation is reduced since the final grade of the pupils includes all their performances during the entire period of schooling.

3.5 Implications of C.A. for the Classroom Teachers:

In the continuous assessment system, the teachers, headmasters, Ministry of Education officials, the School Counsellors and the pupils are expected to be co-operatively involved in the implementation. You can see that C.A. has implication for every stakeholder in the primary school system. But in the final analysis, the teacher becomes the person to do much of the implementation. Therefore, the teacher needs to do certain things and needs to have certain skills for effective implementation of the continuous assessment.

3.5.1 What the Teacher should do:

In the practice of the continuous assessment, the teacher should

- i. Combine the different scores obtained by each pupil from the various aspects of assessment, such as tests, examinations, projects, practical works, assignments etc. carried out within the specified period of classroom instruction. It means then that the sources through which scores should be collected must be decided and planned for in advance.
- ii. Use the scores from the various aspects of the assessment to diagnose pupils' learning difficulties in order to assist the pupils concerned by giving them appropriate remediation. The scores should also be used for the assessment of the teacher's performances and the effectiveness of their instructional strategies with a view to make an improvement where there is a need.
- iii. Be very close to the pupils in order to monitor the personality development of each pupil in the class. The teacher should monitor such aspects of personality as character, temperament, interest, attitude, life-style, adjustment etc.

- iv. Provide data on the pupils performance on measures of personality and make use of such data in arriving at the final assessment of each pupil.
- v. Make use of data accumulated from both pupils academic achievement and personality characteristics for the counseling of the pupils. This will help to assist pupils immensely to overcome their difficulties and lead to the improvement in the level of performance.

3.5.2 Skills Required of Teachers to Implement the C.A.

The implementation of the continuous assessment of programmes in the primary schools require that the teacher should be proficient in a number of skills which include:

- i. Skills in educational Measurement: The primary school teacher should be proficient in the planning, construction and utilization of achievement tests and other assessment tools for the measurement of academic achievement of pupils. This means that the teacher should be able to carefully define and consider the objectives of the lessons in developing the instruments. These objectives must be stated in measurable terms. In addition, the teacher should have a sound knowledge of the relevant subject matter.
- ii. Skills in the assessment of affective and psychomotor behaviour: The teacher should be proficient in planning, designing and utilizing tools or instruments for the assessment of personality characteristics and psychomotor behaviours.
- iii. Skills in scoring and interpretation:- The teacher also be vast in the scoring and interpretation of scores from the assessment instruments of various types.
- iv. Skills in statistical computation:- The teacher should be able to use relevant statistical tests in the continuous assessment practice. This will involve simple tabular and graphical presentation of data, computation of measures of central tendency, measures of variability and computations relating to transformation of scores to standard scores

- v. Skills in recording:- The teacher should be able to maintain proper and detailed records of pupils assessment. He should also prepare and present the pupils' records periodically.
- vi. Skills in integration and co-ordination of teaching strategy: The primary school teacher should have a careful planning of a well integrated and co-ordinated teaching strategies compatible with particular subject matter areas.

SELF ASSESSMENT EXERCISE: 2

- i. What are the rationale for the continuous assessment in the primary school system?
- ii. Explain the skills required for a teacher in the primary school system to implement the C.A.

4. Conclusion

By now you should have noted that without the continuous assessment programme, teachers would be teaching exclusively for examinations. This implies that pupils who are insecure or ill-prepared for the examinations will tend to engage in some examination malpractices in order to beat the examinations. This is not good for the individual, the education system and for the country. Therefore, as a teacher, you should try to discourage examination malpractices by adhering strictly to the practice of continuous assessment for your pupils.

5. Summary

In this unit, you have learnt that the continuous assessment was introduced in the Nigerian education system through the NPE in order to remedy the undesirable effects and examination malpractices inherent in the one-slot examination system. The C.A. has been described as a systematic and regular method or technique for determining what a learner has gained from learning experiences. Various definitions were given.

You also learned that the C.A. is systematic, comprehensive, cumulative and guidance oriented in nature or characteristics. The rationale for the C.A. in the primary school system were give as:

- i. Assessment as a very important part of teaching and learning process;

- ii. It gives a true picture of the pupils ability;
- iii. It facilitates appropriate guidance of the pupils;
- iv. It makes teachers become innovative and creative;
- v. It helps teachers to assess their own teaching;
- vi. It helps to reduce examination malpractices.

You also studied what a teacher should do in a C.A. situation and the skills required of the teacher to implement it.

6. Tutor Marked Assignment

- i. What is continuous Assessment?
- ii. Describe the characteristics of Continuous Assessment
- iii. Explain the skills required of the teacher in implementing the C.A.

7. REFERENCES/FURTHER READINGS

Ezewu, E.E. and Okoye, N.W. (1981). Principles and Practice of Continuous Assessment. Ibadan, Evans Publishers

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ANSWERS TO SELF ASSESSMENT EXERCISES

Exercise I

The four characteristics of C.A. are:

- i. Systematic
- ii. Comprehensive
- iii. Cumulative and
- iv. Guidance-Oriented (Students to explain)

Exercise II

1. The rationale for the C.A. in the primary school system are:
 - i. Assessment is a very important part of teaching and learning process
 - ii. It gives the true picture of a pupil's ability
 - iii. It facilitates appropriate guidance of the pupils.
 - iv. It makes teachers become innovative and creative
 - v. It helps teachers to assess their own teaching
 - vi. It helps to reduce examination malpractices.
2. The skills are
 - i. Skills in educational measurement
 - ii. Skills in the assessment of effective and psychomotor behaviour
 - iii. Skills in scoring and interpretation of scores

- iv. Skills in statistical computation
- v. Skills in recording and
- vi. Skills in integration and co-ordination of teaching strategies

UNIT 2.0 CONTINUOUS ASSESSMENT OF COGNITIVE DOMAIN CONTENT

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 The Cognitive Domain
 - 3.2 Knowledge Level
 - 3.2.1 Memory or Knowledge of Specifics (terminology)
 - 3.2.2 Memory or Knowledge of Specifics (facts)
 - 3.2.3 Memory or knowledge of Ways and Means of dealing with specifics
 - 3.2.4 Memory or Knowledge of Conventions
 - 3.2.5 Memory or Knowledge of Trends and Sequences
 - 3.2.6 Memory or Knowledge of Classification and Categories
 - 3.2.7 Memory or Knowledge of Criteria
 - 3.2.8 Memory of Techniques and Procedures or Methodology
 - 3.2.9 Memory of Universals and Abstractions
 - 3.2.10 Memory of Principles and Generalizations
 - 3.2.11 Memory or Knowledge of Theories and Structures
 - 3.3 Comprehensive on Level
 - 3.3.1 Translation
 - 3.3.2 Interpretation

- 3.3.3 Extrapolation
- 3.4 The Application level
- 3.5 Analysis level
 - 3.5.1 Analysis of Elements
 - 3.5.2 Analysis of Relationships
 - 3.5.3 Analysis of Organizational Principles
- 3.6 Synthesis level
 - 3.6.1 Product of Unique Communication
 - 3.6.2 Product of a Plan or Proposed Set of Operations
 - 3.6.3 Derivation of a Set of Abstract Relations
- 3.7 Evaluation level
 - 3.7.1 Judgement in terms of internal criteria
 - 3.7.2 Judgement in terms of external criteria
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignment
- 7.0 References/Further Readings

1.0 INTRODUCTION

In the last unit, you were exposed to the concept of continuous assessment, the characteristics, rationale, implications and the skills you need in order to implement it in your primary school. You have seen that in the continuous assessment system the pupil is expected to be seen in his or her totality. The pupil is required to exhibit behavioural changes in a desired and desirable direction after being exposed to the school educational programme. If you look at this word behaviour as we have used it here, it connotes all the activities in the cognitive, affective and psychomotor domains. All the possible learning outcomes which you will assess will fall within these three domains of behaviour. These should essentially be in respect of knowledge and understanding possessed by your pupils; attitude interest and changes in behaviour developed, thinking, feeling and belief and also skills acquired. Therefore, you are required to state in clear and behaviour terms the learning outcomes which your pupils are expected to attain after a period of teaching and learning. In this unit, you will be exposed to the cognitive domain of behaviour and how to apply them when specifying your objectives.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- * Explain the cognitive domain
- * Describe the six categories of cognitive domain
- * Discuss the sub-categories of the levels

3.0 MAIN CONTENT

3.1 The Cognitive Domain

Bloom (1956) has described the cognitive domain to include objectives relating to recall or recognition of knowledge and the development of intellectual abilities and skills. Most of the instructional objectives or learning outcomes you find in educational literature or the ones formulated by most classroom teachers are in the area of cognitive domain. If you go through the objectives set by classroom teachers, you will see that most of them are on cognitive domain. In the assessment of the pupils too, teachers dwell much on the cognitive domain. The reason is very simple. Objectives in this domain are easier to formulate and to assess. In fact, most people have the assumption that if you seek first the kingdom of the cognitive, the rest will be added unto you. There are six major categories of objectives in the cognitive domain. These are arranged in hierarchical order of complexity of tasks involved. These categories include knowledge, comprehension, application, analysis, synthesis and evaluation. These categories can further be sub-divided. Before we look at these categories and the sub-categories, note that you are expected to assess your pupils in all the six categories. It means that your pupils are required to exhibit behaviour changes in these areas of behaviour after a period of teaching and learning. Now, let us look at the categories.

3.2 Knowledge

This, otherwise referred to as Memory Level, is the first category of the cognitive domain. It forms the foundation for the development of higher order cognitive skills. It means the recognition or recall of previously learned information with no demand on the understanding or internalization of the information. Look at Krathwohl's (1973) analogy on this level that one thinks of the mind as a store for information, data, facts etc. the task for a test at this level is that of ensuring that the items contain appropriate signals, cues and clues which will most effectively bring out whatever knowledge is filed or stored. Therefore, for measurement purposes, knowledge or memory involves bringing to mind the appropriate material. It emphasizes the psychological process of remembering. When you specify objectives at this level, you can use such action verbs or words that will effectively bring out the information stored in the mind. These verbs include define, list, tell, identify, recall, recognize, remember, what, how many, how much, who, what, which, when, where etc. Let us look at the sub-divisions of the memory or knowledge level.

3.2.1 Memory or Knowledge of Specifics (terminology)

This refers to the cognitive ability to recognize, recall or remember meaning, definition, and use of terms that have become established in the vocabulary of the different subject matter area. It is the basic to any aspect of further learning or higher order skill development e.g. Define reliability. Who is the Senate President of the Federal Republic of Nigeria. List the states in the NDDC area.

3.2.2 Memory or Knowledge of Specifics (facts)

When we talk about facts, we are talking about the bits and pieces of data which are got from direct observation from which knowledge is made. At this level you will be looking at the ability to recall or recognize significant specific facts like dates, names, events, etc. it is very necessary for our understanding and application of the knowledge content of each subject matter area. e.g. list the factors that affect the reliability of a test. List the different types of validity.

3.2.3 Memory or Knowledge of Ways and Means of dealing with Specifics

At this level you are looking at the memory of rules and practices in using, ordering and classifying specifics or in inquiry. It involves the methods and procedures used, the standards and criteria used to judge and endeavour in every field, and of the resulting principles, theories and generalizations.

3.2.4 Memory or Knowledge of Conventions

You know that every area of study has its own characteristic way of testing and presenting specifics and communication which involves specific styles, symbols, conventions, allegories and practices that have been adopted to represent certain ideas, entities and relationships in that field. So the memory of convention involves learner's or pupils' ability to identify, recall or remember such conventions e.g. What is the conventional formula for calculating the reliability co-efficient using the spearman Brown Rank order correlation? What is the conventional representation of 'Centre line' in drawing?

3.2.5 Memory or Knowledge of Trends and Sequences

This deals with the memory of correct order or sequence of occurrence of specifics such as steps in inquiry, periods and events in nature. It involves the recalling or remembering trends in the development of historic periods or the relationship between such periods e.g. list in a

hierarchical order the Blooms taxonomy of the cognitive domain of objectives. List in order the layers of materials used in the construction of a solid ground floor.

3.2.6 Memory or Knowledge of Classifications and Categories

Here, you have the memory of broad classes, sets, or divisions to which a given subject matter, argument, problem etc. is divided and the distinguishing characteristics or properties that determine the placement of an object or phenomenon in one category as opposed to the other e.g. What are the basis for classifying a test as an achievement test/

3.2.7 Memory or Knowledge of Criteria

Here, we are talking about memory of established standards and criteria by which findings, facts, principles, opinions, studies and words in a given area of study are judged e.g. list the criteria for judging a good observation. What criteria are used for assessing a good interview?

3.2.8 Memory of Techniques and Procedures or Methodology.

This deals with the pupils ability to recall or remember methods, techniques and procedures used to conduct inquiries or solve problems in a given subject area. you can see that the emphasis here is on the pupils knowledge of the method, criteria, classifications, etc. and not the ability to use them e.g. Mention the methods of determining the reliability of a test. List 4 methods of selecting samples in research.

3.2.9. Memory of Universals and Abstractions

We have already said that your pupils should have the memory of specifics and of the ways and means of dealing with them. They should also have the memory or knowledge of major concepts, patterns, principles, generalizations, theories and structures which result from the organization of specifics, like data and ideas in a given subject area. You have to note that these universals and abstractions provide the basis for further enquiries for understanding and for solving new problems in a given field.

3.2.10 Memory of Principles and Generalizations

In every subject area you have statements, formulae, or laws which relate or bind two or more concepts together. These provide the basis for explanation and further understanding in that area. your pupils should be able to know these statements, formulae and laws in order to be able to recall or remember them e.g. Write down the formulae for:

- (a) finding the correlation between two ranked scores
- (b) finding the correlation between two ranked scores

3.2.11 Memory or Knowledge of Theories and Structures

This requires that your pupils should have the ability to recall or remember the general theories, structures, models and philosophies on which different aspects of, and practices in the subject area are based. E.g. list the assumptions of inferential statistics. List the philosophies of primary education

3.3 COMPREHENSION LEVEL

This is concerned with the internalization of the knowledge memorized in section 3.2 above. It requires making meaning out of what is stored in the brain file on the basis of which what is understood could be translated, interpreted and extrapolated. It is not possible for you to understand what you have not known in the first place. It is only when you have the knowledge that you can restate it in another form of communication. You can also re-order or re-arrange the knowledge to provide it in a new view or determine its implications and consequences. In the memory level, the pupil is expected to give back what is given to him. But at the level of comprehension, the pupil is expected to give back what he had learned, but in a different form based on how well he has internalized, understood or made meaning out of it. He is required to give a translated or interpreted version or meaning of what is learnt. Some of the action verbs or words which you can use most appropriately to elicit comprehension skills and behaviour include:- re-order, re-arrange, interpret, interpolate, illustrate, explain, demonstrate, differentiate, describe, distinguish, translate, transform, restate, summarise, represent, relate, rephrase, etc. the sub-divisions here are:

3.3.1 Translation

This involves the ability of the pupils to change what they have known from one form of communication such as words, numbers, graphs, maps, charts, cartoons, pictures, formulae, symbols, models, equations, etc. to any other form of communication. It implies the ability to translate from one language to another. It involves converting principles to formulae, restating in words or symbols and translating visual symbols into verbal terms. You can't translate diagrammatic and symbolic representations to verbal descriptions. You can translate equations to verbal, pictorial or symbolic problems. You can translate abstract ideas and technical terms into less complex or more complex, or even more concrete languages. For

example, you are given a graphical representation of your class scores against frequencies and you are expected to translate the graph in verbal terms.

3.3.2 Interpretation

This is an extension of translation. It involves the ability of the pupils to go beyond more literal translation of communication to the identification and comprehension of the major ideas in it, and of their inter-relationships. It involves the interpretation of all forms of communications. Identification of inter-relationship among parts or components of a piece of communication and relating these to the main components. It involves part by part translation, ability to differentiate between components, a determination of the degree of relevance of each basic idea to the central theme of a communication or idea, and the relationships among these basic ideas. You may therefore require skills in examining, comparing, and describing identical or unidentical, simple or complex ideas, views or result of some study or piece of work. You can ask your pupils to interpret a graph or chart. To do this, they will first translate it to a verbal form, then try to understand the relationship among different component parts, they re-order and re-arrange these parts according to their understanding, based on this understanding they describe the meaning of the original communication, presenting it in a more concise form. For example, you are given a graph showing the scores of your pupils in a test and the frequency. You are required to explain the graph and give the relationship between the scores and number of pupils making the scores.

3.3.3 Extrapolation

This goes a step further to draw implications and limited inference based on identified and existing trend. It involves the isolation or detection of consequences, suggestions of possible meaning and prediction or estimation of possible effects. When your pupils acquire the extrapolation skills they exceed the literal limit of communication. They extend interpretation beyond what is presented, but based on established trend. It means your going beyond the data, extending the line of reasoning, pattern or trend. It gives you the ability to fill up a gap in a line of reasoning. For instance, from the graph of scores against frequencies, or from the gender distribution of the scores, you can reason that the means score of the female pupils would have increased if the length of the test was increased. Or that the boys would have done better if the test was on mechanical aptitude.

3.4 APPLICATION LEVEL

This is the use of abstractions in particular and concrete situations (Bloom, 1956). These abstractions could be in the form of general idea, rules, procedures or generalized methods. They can also be in the form of technical terms, principles, ideas and theories which must be remembered, understood and applied. You can see that understanding is very necessary for the correct application of what is learned. According to Bloom et.al, (1971) ability to apply what you learn is one of the more permanent acquisitions in learning. When a pupil is able to apply what he knows in trying to solve a new problem or in a new situation, we say he has skill in application. This is not the same thing as solving the problem by remembering the solution or the precise method of solving a similar problem in the class. The problem situation must be new, unfamiliar and different from those used in the class during institution or those in the text book. Such new situations should be real and should afford the pupil good practice in the transfer of training and learning to a real life problem. Apart from the skills of these include ability of the pupil to grasp exactly what the problem is all about and what generalizations or principles are relevant, useful, or pertinent for the solution statement in order to determine exactly what is given and what is needed to successfully solve the problem. You have to first recognize and identify extraneous or irrelevant elements in the problem statement which you must avoid or ignore in order to solve the problem. This can lead you to recast and restate or redefine the problem.

The next step is for the pupil to search through the memory of generalizations, principles and methods to find those which are relevant to the solution of the problem at hand. In other words, at this level you need to have the ability to determine which, and explain how such a generalization, principle or method is appropriate in solving the problem, specify the limit within which, recognize the exceptions to, predict what will happen if, and justify the use of a particular generalization; principle, and method used in solving the problem (Bloom et al 1971). There are some action verbs or words appropriate for this level. These are:- apply, employ, relate, build, calculate, explain, how, choose, classify, determine, present, predict, resolve, solve, specify, state, transfer, organize, demonstrate, restructure, etc.

SELF ASSESSMENT EXERCISE 1

- i. What are the sub divisions of comprehension level?
- ii. Give 5 examples of objectives in the application level

3.5 ANALYSIS LEVEL

According to Bloom (1956) analysis is the breakdown of a communication into its constituent elements or parts such that the relative hierarchy of ideas is made clear and/or the relations between the ideas expressed are made explicit. It implies that the ability to tear apart a problem, a work, a design, a communication or an approach in a highly complex skill which makes use of it, but goes beyond memory, comprehension and application. Under analysis the pupil should determine how a communication does what it does, to isolate the underlying framework, parts; ideas and devices which make up a piece of communication; to determine the inter-relationship between these elements; and establish the organization, or systematic arrangement and structure which hold the entire communication together. Let us use geometry as an example, analysis involves the ability to break down and detect fault in a line of geometrical reasoning or proof, discover relationship and construct proof to substantiate such discovery. Appropriate verbs or words at this level include:- compare, contrast, deduce, analyze, categorise, detect, determine, establish evidence, draw, disseminate, distinguish, recognize, support, why etc. The sub division include:-

3.5.1 Analysis of Elements

This is concerned with the ability to identify the underlying elements in a communication. The elements include assumptions, hypothesis, conclusions, views, values, statements and arguments. It involves the determination of the nature and function of such elements in the communication. It includes the ability to recognize unstated assumptions, hypothesis, etc and implied views, and to distinguish between factual and normative statements (Bloom et al, 1971).

3.5.2 Analysis of Relationships

This tries to determine how the elements isolated in section 3.5.1 above are related to each other. For instance, how does a hypothesis relate to the evidence and how do both hypothesis and evidence relate to the conclusion. How does assumptions relate to the argument. When such relationships are determined they form the basis for determining the relevance of each element and the consistency of the communication.

3.5.3 Analysis of Organizational Principles

This involves the determination of what principles or system of organization holds the different elements and parts together in a communication. It involves the ability to discover the pattern, organization principle, systematic arrangement, the structure, the point of view, authors purpose or the thought which underlies or on which the

entire work is based. It includes reasoning from the general or whole to the specifics, parts or components.

3.6 SYNTHESIS LEVEL

This involves the ability to put together elements, parts, pieces and components so as to form a unique whole or to constitute a novel form, plan, pattern or structures. It includes problem solving or creative skills like putting together in a unique organizational form a literal work in writing or in speech that conveys to others novel ideas, feelings and experiences. You have seen that analysis involves breaking down or tearing apart, but synthesis involves building together. It calls for divergent thinking which starts from an analytic view of a problem. It results in a variety of possibilities radiating or diverging out to many satisfactory answers. The generalization of novel responses that are original, varied and unusual but effective in contributing to the solution of the problem, is involved. Synthesis problems require the pupil to generate multiple solutions to the problems. For instance, you can ask your pupils to recommend different uses for a plastic clip. To this effect, you will be surprised the number of uses that will be generated. In scoring, you can take into consideration fluency, flexibility and originality of the responses.

Synthesis calls for imaginative, original and creative thinking. You can see that a creative-thought process will result in discovery of new knowledge. At the primary school level synthesis calls for simple problems that require creative answers for the development of questioning minds that are sensitive to problems. You should therefore present the pupils with problems designed to stimulate original thinking which is not satisfied with most obvious stereotyped answers. Synthesis questions should allow the pupils great freedom at seeking solution, they should use many possible approaches. You should not expect a definite answer from all the pupils. Action verbs or words at the synthesis level include: draw up, express, formulate, produce, propose, put together create, design, develop, derive, deduce, illustrate, modify, specify, suggest, write, transmit, etc. The sub divisions are

3.6.1 Production of Unique Communication

This is concerned with the ability of your pupils to put together in a unique organizational form a piece of written or oral communication that conveys a novel idea, feeling or experience to others. We talk about synthesis skills when the problem at hand is new and requires original ideas from the pupils. In this case, the pupils should have considerable freedom in redefining the task for themselves. The type of communication may include work start, music, speech, essay, drama etc.

3.6.2 Production of a plan, or proposal set of operations

This involves the ability to develop a plan or to propose some procedures for solving a problem or dealing with a task. The pupil does not need to execute the plan, but his proposal should meet the requirements of the problem, specify the different sources of data to be taken into account and satisfy the standards and criteria generally accepted in the field of study.

3.6.3 Derivation of a set of abstract relations

Under this taxonomic sub-level, a pupil is expected to use the results of an analysis or experimental data, observations or other specifics, to form concepts, generalizations, deduce propositions, a set of abstract relations or explanatory conceptual model with which to explain the observed and provide a basis for prediction of future observations. Derivation of relationship starts with the classification of experiences or observations. Following this then is the categorization and/or quantification through which functional relationship emerges and is noted. Based on these observed relationships, generalizations could be obtained.

SELF ASSESSMENT EXERCISE 2

- i. Explain the sub-divisions of analysis and synthesis
- ii. Propose 3 objectives each at the analysis and synthesis levels.

3.7 EVALUATION LEVEL

At the highest level of the cognitive domain is evaluation which can be described as the making of quantitative or qualitative value judgement about a piece of communication, a procedure or method, a proposal among others, based on internal or external criteria. At every point in one's life, there are many alternative to choose from. Our choice is made based on the result of judgement which we make consciously or unconsciously based on values we hold. Every day, you make series of judgement like good-bad, agree-disagree, like-dislike, yes-no, etc about anything you see or hear. To this effect, you are making simple evaluation that may not be based on logical or rational judgement, but are mere expressions of your taste. We look at evaluation as an educational objective in connection with the pupils ability to organize their thoughts and knowledge to reach a logical and rational judgement or decision that can be defended.

Evaluation can be seen as the most complex of human cognitive behaviour. It requires the pupils to make judgement about something they know, comprehend, apply, analyse and synthesise based on explicit or implicit criteria. Action words,

verbs or phrases in evaluation include:- appraise, assess, choose, compare, contrast, conclude, decide, evaluate, consider, judge, select, validate etc.. The sub-divisions here are:-

3.7.1 Judgement in terms of internal criteria.

Here evaluation is done based on internal criteria like internal consistency of an argument or presentation, logical accuracy and coherence of a communication, and the absence of other organizational and internal flaws. In order to make an evaluation of a piece of work, it is analysed into its component parts. Each part is assessed individually for accuracy. The parts are then assessed together for logicity, coherence and consistency in argument and presentations and good organization of idea. Pupils should have the ability to make accurate judgement in terms of accuracy, precision of each component, the relationship among parts like introduction assumptions, hypothesis, evidence, methodology, conclusions and recommendations etc.

3.7.2 Judgement in terms of external criteria

In this case, judgement is made based on a given set of criteria or standards, or a set of criteria devised explicit by the person doing the evaluation. In other words, the criteria for comparison is external. A decision can be made based on how well the different components or parts of the work matches the set criteria. Take for instance, the lesson, you teach to your class, the programme is B.A. Ed Primary Education, or even this course, you will see that the objectives serve as the criteria for judgement. This means that judgement as to the effectiveness or success in the lesson, programme or the course is made based on how well you have achieved the objectives. Evaluation can also involve the comparison of a work with other relevant works in a given field.

4.0 CONCLUSION

In this unit, you have gone through a detailed exposition of the cognitive domain. You have seen the components and the action verbs which you can use when specifying instructional objectives at the respective taxonomic levels. In the next unit, we shall be looking at the remaining two domains together.

5.0 SUMMARY

In this unit, you learnt that the cognitive domain includes objectives relating to recall or recognition of knowledge and the development of intellectual abilities and skills. It has six major taxonomic categories-knowledge or memory, comprehension, application, analysis, synthesis and evaluation. You have seen the sub-divisions of these categories and the action verbs you can use at each sub-level.

6.0 TUTOR MARKED ASSIGNMENT

- i. What is cognitive domain/
- ii. Explain the sub-levels in the knowledge level
- iii. Specify 5 objectives at the application level.

7.0 REFERENCES/FURTHER READINGS

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ANSWERS TO SELF ASSESSMENT EXERCISES

EXERCISE 1

1. The Sub-divisions of the comprehension level are:-
 - (a) Translation (b) Interpretation and (c) Extrapolation
- ii. Students are expected to give 5 objectives at application level.

EXERISE 2

- 1(a) The sub-divisions of analysis are:-
 - (a) analysis of elements (b) analysis of relationship
 - (c) analysis of organizational principles
- 1(b) The sub-divisions of synthesis are:-
 - (a) Production of unique communication
 - (b) Production of a plan, or proposed set of operations
 - (c) Derivation of a set of abstract relations

UNIT 3.0 AFFECTIVE AND PSYCHOMOTOR DOMAINS

CONTENT

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 The Affective Domain
 - 3.1.1 Receiving
 - 3.1.2 Responding
 - 3.1.3 Valuing
 - 3.1.4 Organization
 - 3.1.5 Characterization by a value
 - 3.2 Why teachers do not always assess the Affective Behaviour
 - 3.3 The Psychomotor domain
 - 3.3.1 Reflex Movement

	3.3.2	Basic Fundamental Movement
	3.3.3	Perceptual Abilities
	3.3.4	Physical Abilities
	3.3.5	Skilled Movement
	3.3.6	Non-discursive Communication
4.0		Conclusion
5.0		Summary
6.0		Tutor Marked Assignment
7.0		References/Further Reading

1.0 INTRODUCTION

In the last unit, you studied in details, the cognitive domain. It was detailed because most classroom objectives focus on the cognitive behaviour. In a continuous assessment situation, the cognitive, the affective and the psychomotor behaviours are supposed to be assessed. This is why in this unit; we shall touch on the affective and psychomotor domains briefly. It is hoped that you will always incorporate objectives in these domains when specifying your instructional objectives.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- i. describe the affective domain
- ii. explain the levels of affective domain
- iii. describe the psychomotor domain
- iv. explain the levels of psychomotor domain
- v. construct objectives in both affective and psychomotor

3.0 MAIN CONTENT

3.1 The Affective domain

This has to do with values and beliefs, attitudes and appreciation, interest, social relation, emotional adjustments, habits, life-styles, etc. When you talk about the affective domain, you are considering such behaviours and

objectives that have emotional overtone as it encompasses likes and dislikes, attitudes, values, beliefs, etc. Basically, the instructional objectives in this domain deals with how the pupils have internalized and appreciated what they have learnt as demonstrated in the way it has influenced their feelings and behaviour. Affective behaviour is generally covert in nature. Examples of learning outcomes in this domain include:-

- ❖ The pupil should be able to show awareness of the importance of observing the safety rules and regulations in the workshop
- ❖ The pupil should be able to appreciate the need to take adequate care of drawing instruments
- ❖ The pupil should be able to show interest in science subjects.

Krattwohl et al (1964) classified the affective domain into five hierarchical levels. These include:

- i. receiving,
- ii. responding
- iii. valuing
- iv. organization
- v. characterization by value

3.1.1 Receiving

This refers to the pupils willingness or disposition to attend to a particular stimuli such as classroom activities, art work etc. The learning outcomes here can range from simple awareness that something exists to selective attention by the pupil. Receiving is the lowest level of the affective domain. The pupil is expected to listen attentively, show awareness of the importance of reading or learning, exhibit sensitivity to known human needs and social problems, attend closely to classroom activities, etc. The three sub-levels here are:

- (a) Awareness: this relates to the pupils conscious recognition of the existence of some problems, conditions, situations, events, phenomena etc.
- (b) Willingness: This refers to the pupils ability to acknowledge the object, problem, event, condition, phenomenon, etc. instead of ignoring or avoiding it.
- (c) Selected or Controlled attention: This refers to the pupils ability to choose or select to pay attention to the situation, event, problem, phenomenon. Etc.

3.1.2 Responding

This refers to the active participation of the pupils to attend to the stimuli and react to them. Specifically, learning outcomes in this level lay emphasis on the acquiescence in the act of responding, for example reading assigned materials; willingness or disposition to respond, for example voluntary reading beyond assigned material; or satisfaction in responding, for example reading for pleasure or enjoyment. You will note that the interest the pupils have makes or propels them to seek for certain activities and enables them to enjoy the activities. This is the reason why in your class you may ask and get volunteers for special tasks. This is why you have pupils with interest in a particular subject. This is why you can have pupils who enjoy helping others. Responding has three sub-levels which include:

- i. acquiescence in responding; This involves a simple obedience or a simple compliance
- ii. willingness to respond: In this case, there is a voluntary response to a given situation
- iii. Satisfaction in response: This involves satisfaction with the response. This leads to the pupils enjoying reacting to such type of situation.

3.1.3 Valuing:

This is referred to as the worth or value which a pupil attaches to a particular object, stimuli, phenomenon or behaviour. It could range from simple acceptance of a value like the desire to improve his group skills, to some more complex level like commitment as in assuming responsibilities for effective and efficient domain is based on the internalization of a set of specified values. The instructional objectives which have commonly been classified under attitudes and appreciation fall within this level. This is because values and beliefs determine attitudes and appreciation. According to Kibler et al (1981) an important element of behaviour characterized by valuing is that it is motivated not by the desire to comply or obey, but by the individual's commitment to the underlying value guiding the behaviour. At this level pupils value more of group work. They demonstrate belief in the democratic process. They appreciate traditional or classical music. They exhibit problem solving attitude etc. the sub-levels here include:-

- i. Acceptance of value:- Which concerns a situation where the pupils have a tentative belief in a doctrine, condition, situation or a proposition.

- ii. Commitment to a value:- which is the stage at which the pupil is convinced and committed to the doctrine, situation, principle or cause. He internalizes a set of specific values which consistently manifest in his behaviour and attitude.

3.1.4 Organization

This involves primarily the bringing together of different values, resolving any existing conflicts between them and then building an internalized consistent value system. According to Kibler et al (1981), when pupils internalize values, they encounter situations for which more than one value is relevant. To this effect, they need to organize the values into a system; to determine the inter-relationships among them and to establish the dominant and pervasive ones. Your emphasis is placed on comparing, relating and synthesizing values. Learning outcomes in this level may include the conceptualization of values like recognizing individual responsibility in respect of improvement to human relations. It also includes the organization of a value system. Instructional objectives which are related to the development of a philosophy of life fall within this category. It has two sub-levels:

- i. Conceptualization of value:- which involves the understanding of the relationship of abstract elements of a value to those already held or to new values which are gaining acceptance.
- ii. Organization of value system: which involves the development of a complex value system, which includes all the values that cannot be compared for the purpose of making choices in order to promote public welfare, instead of the sheer aggrandizement of special personal interest.

3.1.5 Characterization by value or a value complex

The individual pupil exhibits a value system which has controlled his behaviour for a sufficient time. This leads to the development of a characteristic life style. Every behaviour developed at this stage could be pervasive, consistent and predictable. Such behaviour when exhibited does no longer arouse emotion except when the individual is challenged or threatened. Learning outcomes at this level cover a wide range of activities. However, it emphasizes the fact that the behaviour is typical, peculiar or characteristic of the individual pupil. Instructional objectives at

this level relate to the pupils general patterns of personal, social and emotional adjustment. There are two levels here:

- i. Generalized Set: which refers to a situation where the orientation of the individual enables him to reduce or to order a complex environment and to act consistently and effectively in it. The individual is free to change his judgements and behaviours based on available new and valid evidence.
- ii. Characterization: this refers to the internalization of a value system in such a way that the individual is consistently acting in harmony with it.

Take a look at the National Policy on Education (NPE, 2004). You will notice that out of the four educational objectives formulated or specified for the Nigerian Education System, two of them are predominantly affective in nature, but has occasional cognitive undertones. According to Nwana, (1988) the third objective which is predominantly cognitive, also has some in-built affective overtones. Look at the objectives

- i. the inculcation of national consciousness and national unity.
- ii. The inculcation of the right type of values and attitudes for the survival of the individual and the Nigerian society, and
- iii. The training of the mind in the understanding of the world around.

It is imperative therefore, that the affective behaviours be taken care of and be developed in the pupils in the school system. These behaviours need to be assessed too. This is why the affective report indicated in the government handbook on continuous assessment indicated some dimensions of the affective domain which you as a teacher have to assess in your pupils. These are:

- i. attendance to class
- ii. carrying out assignments
- iii. helping others
- iv. honesty
- v. initiative
- vi. neatness
- vii. obedience
- viii. participation in class activities
- ix. politeness
- x. punctuality

- xi. relationship with staff and fellow students
- xii. self control
- xiii. sense of responsibility

In every pupils, continuous assessment report card, you as a teacher are required to show the manifestation of these effective behaviours on a five point likert-type scale. These start from 5, 4, 3, 2, 1. The highest shows excellent manifestation of the behaviour, while the least shows very poor manifestation. Note that these affective behaviours are not uniform in all the schools in this country. You can find some variations and other dimensions in different school report cards. But most of the times these affective behaviours are not assessed.

3.2 Why teachers do not always assess the affective behaviours.

Some of the factors include;

- i. Assessment of these behaviours is inherently subjective and difficult.
- ii. The dimensions are sometimes not clear for assessment
- iii. Lack of skills necessary for effective assessment of these behaviours
- iv. Promotions, certifications, graduations, failure, etc in the school system are based entirely on cognitive and psychomotor achievement at the neglect of affective.
- v. The long time focus on the cognitive domain in the school system.
- vi. No objective, valid and reliable instrument for assessing these affective behaviour. Assessment here is based on subjective situations.

SELF ASSESSMENT EXERCISE I

- i. What is the affective domain?
- ii. What are the levels of affective domain?
- iii. Set 5 examples of objectives in the affective domain.

3.3 The Psychomotor domain

In this domain of behaviour, we talk about manipulative skills which your pupils have naturally or have developed or acquired. It deals with body movements. It is concerned with dexterity in the body movement and the manipulation of the body and the limbs. Behaviours exhibited here could be in hand-writing, drawing, setting up or using laboratory and workshop

equipment, typing, operating machines, playing, dancing, swimming, driving, sheeting, playing music etc. You can see that most of the activities here fall within muscular activities like games, athletics, gymnastics, etc. finger dexterity as in drawing, writing, typing and use of hand tools like burettes, forceps, etc and mechanical workshop operations like repairs, filing, fittings, paintings etc. there are six hierarchical levels of the psychomotor domain.

3.3.1 Reflex Movements:-

This is at the lowest level in which every normal human being should be able to make. All the movements are natural except where the case is abnormal. They include swallowing things, urinating or stooling by a child, twinkling of the eyes, jumping up when there is danger etc.

3.3.2 Basic Fundamental Movements:-

This is like the reflex movement where we have basic movements that are natural. You as a teacher have little or nothing to do with them. But if there is an abnormal case special educators can step in to assist. There are three sub categories here. They are:

- i. Locomotor Movement: This is concerned with movements of the body from place to place, e.g. crawling, leaping, walking etc.
- ii. Non-locomotor Movement: The body movements here do not involve moving from place to place. They include muscular movements, shaking of the heads, waving of hands, wriggling of trunk, turning, twisting of the body etc.
- iii. Manipulation Movements:- This involves the use of the hands or limbs to move things or to control them.

3.3.3 Perceptual abilities:

This involves the senses and their developments. As a teacher, you have not much to do in this case except to direct the use of these senses to conform with certain conditions. Ability to perceive and distinguish things using the senses is involved here. You can recognize and compare things by physically tasting, smelling, seeing, hearing, touching etc. You can use the sense of touch, smell, sound, feeling etc to associate and understand certain objects or situations and to determine conditions and necessary line of action.

3.3.4 Physical Abilities:-

This is concerned with the health and physical education. Sports or games and athletics require physical abilities which can be developed to varying degrees of perfection through exercises. If you are a sportsman or woman, you need to practice in order to improve on your skills of endurance, strength, flexibility and agility.

3.3.5 Skilled Movements:

Here, you can apply or combine the skills acquired in 3.3.4 in making or creating things. You can combine the skills inflexibility, endurance, manipulative etc to draw or write. You can combine neuromuscular movements with flexibility to help you in drawing. Combat sports like wrestling, boxing, judoka, weight lifting etc involve a combination of straight, endurance, flexibility and manipulative movements. There are three sub-levels here. They are simple adaptive skills, compound adaptive skills and complex adaptive skills.

SELF ASSESSMENT EXERCISE 2

Give 5 examples of activities in which skilled movements are involved.

3.3.6 Non-discursive Communication

As the highest level of the psychomotor domain, it involves a combination of all the lower levels to get to the high degree of expertise. For instance, you can only use the computers, if you have a good deal of training, practice and ability to combine certain movements of the fingers in order to manipulate the keyboard and the mouse. You also need certain level of perceptive abilities in order to be able to interpret or decode the messages. You can move your limbs and legs. But for you to do such a activities like driving swimming, typing, cycling, browsing the internet etc. you need some level of training, practice and abilities to combine a variety of movements and perceptual abilities. There are two sub-levels here they are expressive movements and interpretive movements.

Now, look at the fourth national education objective. What did it say? It talks about the acquisition of appropriate skills, abilities and competences both mental physical as equipment for the individual to live and contribute to the development of the society. You can see that this objective embraces both the cognitive and psychomotor domains of behaviour. It implies that teaching and learning of psychomotor should be directed towards the acquisition and transfer of practical operational skills. These skills must be assessed in the continuous assessment situation.

Before we close this discussion on the domains of educational objectives, you need to know that all three domains of behaviour should be taught, assessed and the results used in taking decisions about the pupils. This is because the basis lies on the fact that education aims at moulding and developing the individual in his totality.

4 CONCLUSION

In a continuous assessment system, every pupil is expected to be developed in his or her totality. Every child is expected to exhibit changes in behaviour towards the desired and desirable direction after undergoing or passing through the school system. You are therefore expected to state your objectives in clear and behavioural terms to involve all the domains of behaviour. You need also to assess these objectives as stated. In this way you are incorporating all the domains in your teaching learning process.

5 SUMMARY

In this unit you have learnt that the affective domain has to do with values and beliefs, attitudes, interest, social relations, emotional, adjustments, habits, life styles etc. The hierarchical levels include receiving, responding, valuing, organization and characterization by value or a value complex. Each of these levels has some sub-levels. You also studied the psychomotor domain with six levels including reflex movement, Basic fundamental movement, perceptual abilities, physical abilities skilled movement and non-discursive communication. Each of these has sub-levels too. All the domains should be taught and assessed in order to develop the totality of the individual.

6.0 TUTOR MARKED ASSIGNMENT

Give reasons why teachers do not like to assess the affective domain.
List ten behaviour which should be assessed in the affective domain.

7.0 References/ Further Reading

Bloom, B.S; Hastings, H.T. and Maddus, G.F. (1971). Handbook of Formative and Summative Evaluation of Students Learning. New York. McGraw-Hill Book Company.

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ANSWERS TO SELF ASSESSMENT EXERCISES

1.
 - i. This has to do with values and beliefs, attitudes and appreciation, interest, social relation, emotional adjustments, habits, life-styles, etc. When you talk about the affective domain, you are considering such behaviours and objectives that have emotional overtone as it encompasses likes and dislikes, attitudes, values, beliefs, etc
 - ii. The levels of affective domain are;-receiving, responding, valuing, organization and characterization by value .
 - iii. The student should specify his own examples.

2. Examples of skilled movements can be seen in the following;-
Typing, playing the piano, cycling, jumping, driving, shooting, relay-race etc.

MODULE 2.0; CONTINUOUS ASSESSMENT INSTRUMENTS AND
TECHNIQUES

CONTENT:

UNIT 1.0 TESTS I

UNIT 2.0 TESTS II

UNIT 3.0 PROJECTS AND ASSIGNMENTS

UNIT 4.0 OTHER INSTRUMENTS AND TECHNIQUES

UNIT 1.0 TESTS 1.

CONTENT

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Tests
 - 3.2 Preparation of classroom tests
 - 3.2.1 Planning tests
 - 3.2.2 Construction of test items
 - 3.3 Essay test items
 - 3.3.1 Guidelines for constructing essay test items
 - 3.4 Objective Test Items
 - 3.4.1 Supply types
 - 3.4.2 Selection types
 - 3.5 Guidelines for writing Good Multiple Choice items
 - 3.6 Item Analysis.
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignment
- 7.0 References/Further Reading

1.0 INTRODUCTION

In your course on measurement and evaluation, you studied tests and tests types. Your knowledge from that course is still relevant in this one. In this unit, we shall only touch

on some of these pieces of information very briefly. You are going to read about tests, types of tests items used in the continuous assessment system. It has been emphasized before, and we are emphasizing again and throughout this course that tests are developed to measure whether objectives have been met. It implies that at every stage of the teaching-learning process, specification of the objectives in explicit terms is very paramount.

2.0 OBJECTIVES

At the end of this unit, you should be able to:-

- i. Define a test
- ii. Describe the types of tests items
- iii. Explain the types of objective tests
- iv. Discuss essay tests
- v. Construct objective test items
- vi. Construct essay test items

3.0 MAIN CONTENT

3.1 Test is the major and most commonly used instrument for continuous assessment. It is defined as a sample of pupils' performance on items that have been designed to measure pre-selected objectives. In other words, it is a set of questions which pupils are expected to answer. The responses of the pupils to the questions give a measure of their level of performance or achievement. Test items are usually based on topics or sub-topics within a subject. These are directed to measure your pupils' level of attainment of pre-specified objectives. It means that the test and the performances they require are related to measure the objectives you want them to measure. It is important therefore that you always state your objectives using action verbs only. This will help you determine the test items you need to construct to measure pupils' mastery of those things you intent for pupils to master.

3.2 Preparation of Classroom Test

When you want to prepare your classroom test for the measurement of your pupils academic achievement, you need to take the following steps:

1. Planning
2. Development and
3. Evaluation of test items (item analysis)

3.2.1 Planning Test

This is a very important aspect of test construction. This is because it will help you to see that the test you are constructing covers the pre-specified instructional objectives. It will also help you to make sure that the topic and sub topics of the subject under

consideration are covered. This implies that a major purpose of planning the test is to ensure content validity. To refresh your memory again, content validity is concerned with the extent to which a test measures a representative sample of the subject matter content and instructional objectives specified for your class. Therefore, in order to make sure that the test you are preparing has content validity you will have to

- i. identify the instructional objectives specified for the subject
- ii. identify the subject matter covered during the teaching/learning period in the class and
- iii. preparing the table of specifications

- i. Identifying the instructions objectives:

In module 1, unit 2.0, you studied in details the classification of the instructional objectives in the cognitive domain. You learnt that the objectives can be classified into six hierarchical levels of knowledge/memory, comprehension/understanding, application, analysis, synthesis and evaluation. These categories of Bloom's taxonomy of educational objectives in the cognitive domain were explained in details in that unit.

At the primary school level, specifying objectives and measuring them at the application, analysis, synthesis and evaluation categories are usually very difficult. This is very true and more with beginners in test construction. This is why some objectives as specified by condensing these four categories into one category. Now, let us see an example of such a condensed form developed by the Educational Testing Service (ETS), Princeton, New Jersey. This is highly recommended for the use of the classroom teacher in the primary school. Let us first look at the relationship between the Bloom's sub categories and the condensed ETS version as presented in the table 1.0

S/N	Bloom's Taxonomy	S/N	ETS Taxonomy
1.	Knowledge	1	Remembering
2.	Comprehension	2	Understanding
3.	Application)	3.	Thinking
4.	Analysis)		
5.	Synthesis)		
6.	Evaluation)		

Table 1.0 Relationship between Bloom and ETS version

You can see from the table above how application, analysis, synthesis and evaluation levels are equated to and condensed to thinking level of the ETS version. It implies that instructional objectives beyond comprehension level fall within thinking level. It also means that after remembering and understanding facts, pupils should think and

make use of the facts in new situations. We shall be using the ETS here since we already used the Bloom's in the Measurement and Evaluation

ii. Identifying the Subject Matter:-

At the planning stage of a test, you need to identify the topics and/or sub-topics on which the test is to be based, the outline of the subject matter or content outline is based on what you as the classroom teacher have treated with your pupils during the period of teaching-learning. It is usually a better pedagogy to specify the objectives before the instruction and/or the content outline. A list of objectives forms the basis for a content outline. It serves as the basis for determining what test items must be written. Let us take a content outline as a list concepts or tasks to be mastered in a lesson; the following steps are ordinarily followed in the preparation of a content outline, for test construction.

- a. Identify the segment of instruction for which testing will be done. This is for you to make sure that assessment accurately reflects the achievement of the pupils in that segment. A segment can be a unit, a week, a term, half a year or even a yearly instruction.
- b. specify the concepts, ideas, or skills covered in the segment
- c. restate the concepts, ideas or skills in behavioural terms. This is because what you are measuring are performances that reflect concepts, ideas and skilled to be learned.
- d. indicate any differences in relative emphasis of various objectives since all the objectives in the outline may not be of equal emphasis apply the weighting system to the level of emphasis.

iii Preparing the table of specifications:

As you already know, the test blueprint, otherwise called the table of specification is a device that enables you to arrive at a representative sample of the instructional objectives and the subject matter treated in the class. Once you have clearly identified the instructional objectives and the subject matter, you can go to the next step, which is preparing the test blueprint. This is to link both and also indicate the number of test items to be written for each level of objective and each area of subject matter. The steps to follow are:

- a. decide on the number of items or questions you intend to develop
- b. list the instructional objectives
- c. list the subject matter (content outline)
- d. indicate the number of test items to be set for each level of objectives and each content area.

You have to note that the relative emphasis given to the subject matter and the objectives depends on the emphasis given to them during the period of teaching and learning. Look at this example:

CONTENT	OBJECTIVES			TOTAL
	Remembering	Understanding	Thinking	
Subject Matter				
Frequency Table	2	2	3	7
Ideographs	1	2	2	5
Bar Graphs	2	2	2	6
Pie Chart	2	2	3	7
Histogram	3	3	3	9
Frequency Polygon	1	2	3	6
Cumulative Frequency Curve	1	1	1	3
Cumulative Percentage Curve	1	1	1	3
TOTAL	13	15	18	46

Table 2.0 – Table of specification for a 46 items in statistics test

If you take a look at the table above, you notice that among the eight subject matter areas, Histogram attracted the highest number of items (9), while Cumulative frequency and cumulative percentage curves attracted the least (3) each. We have already said that this depends on the emphasis you attach to the subject matter area. Having done with the table of specification, you can now proceed to constructing the test items. This must follow what you have specified in the table.

Construction of Test Items

When you want to construct a tests, you will first consider the various kinds of tests items that can be used for your purpose. Having decided on the type of test items you want to use, you follow the guidelines in writing the test items. For your classroom use, there are two broad types of test items in common usage. These are (a) Essay type items and (b) Objective type items. We shall look at these in the next sub-sections.

3.3 Essay Test Items

As a classroom teacher, you must be familiar with the essay test items. They are the item types commonly used in the school system because of the ease of construction among other considerations. An essay item is that which allows pupils to select, organize, integrate and synthesis their answers or responses in order to present them in their own styles and their own words. An essay item could be extended or restricted,

depending on the amount of freedom given to the pupil to organize his ideas or facts in order to present his answer. Can you think of examples of each of the types, as you use them in your class? Look at these examples.

(a) Extended type:

- i. Describe the construction of a histogram
- ii. Explain the applications of the helix
- iii. Discuss the factors considered when choosing a

(b) Restricted type:-

- i. Give 3 advantages of essay test
- ii. List 4 sources of research problems
- iii. Mention 5 parts of a circle

The nature of essay items makes marking or scoring to be subjective. Again, because, it is very easy to set, some teachers set essay items that are not good. These tend to affect the reliability and validity of the essay items. Therefore, you should give much care and attention to the construction and scoring of essay tests. You have to follow the guidelines given.

3.3.1 Guidelines for constructing Essay test items

- i. Construct questions that are very clear. This will help to elicit accurate type of behaviour which you intend to assess.
- ii. Do not make the questions to be too many or too lengthy
- iii. Break long essay items into shorter ones that will require the pupils to give short answers.
- iv. Let the pupils answer all the questions i.e. no optional items. This provides the basis for using the same instrument for the evaluation of their level of achievement.
- v. Let the questions set cover the objectives and the subject matter specified in the test blue print.
- vi. Indicate the mark or point value for each question and also the time limit for answering the questions.
- vii. Restrict the use of essay questions to the learning outcome that cannot be satisfactorily measured by objective test items.

SELF ASSESSMENT EXERCISE:

In your area, select a topic and set 5 essay questions. Prepare the marking guide and identify the type of essay items.

3.4 Objective Test Items

As you have already known, objective test items are regarded as highly structured test items to which the pupils are expected to supply the answers. These could be a word or two, symbol or formula, numbers or figures or select the correct answer from a limited number of alternatives or choices. This means that objectives test items can be classified into (a) supply items and (b) selection types. Each of these can be further sub-divided

3.4.1 Supply Types:-

This type can be sub-divided into two. These are (a) short answer items and (b) completion items.

(a) Short answer items:- In this case the item is presented as a direct question. For example:-

- i. Who is the president of the Federal Republic of Nigeria?
- ii. Where is the headquarters of United Nations Organization?
- iii. Who is the current World footballer of the year?

(b) Completion items:- In this case an incomplete statement is made and the pupils are expected to fill the blank space(s). For example:

- i. Nigeria gained her independence in the year
- ii. In the equation $3x + 4 = 19$; $x =$ _____
- iii. A plane figure bounded by four straight sides is called _____

You can see from these examples that most supply items require the pupils to recall information rather than recognize it. The two varieties are essentially the same, differing only in the method of presentation of the problem. They are very much appropriate for the lower classes of the primary schools.

3.4.2 Selection Types:

There are three common types in this category. They are:-

- (a) alternative response type
- (b) matching type and
- (c) multiple choice items

(a) Alternative Response Items:- This is the type whereby pupils are presented with two choices or options. They are required to select one as the correct answer. The two options may be True/False, Correct/Incorrect, Yes/No, Right/Wrong etc. The most

common in the classroom usage is the True/False. Here, information or a statement is given and the pupils mark either True or False. For example:

- (i) Lagos is the capital of Nigeria. True or False/?
- (ii) All plane figures bounded by four sides are called quadrilateral.
True or False
- (iii) The normal curve is asymmetrical. True or False

(b) Matching Items:- This is the type whereby two columns of items which are usually unequal are provided and the pupils are expected to identify pairs of the items which are associated on the basis of specified direction. One column usually contains items to which a match is sought. These items are referred to as the premises. While the other column contains items from which selections are to be made. The items here are referred to as responses. For example:-

Column A	Column B
i. Coal City State	A Anambra State
ii. The Big Heart	B Ogun State
iii. The Gateway State	C Osun State
iv. Gods own State	D Abia State
v. The Food basket	E Enugu State
	F Delta State
	G Benue State
	I Edo State
	J Kano State
	K Plateau State

In this case a corresponding instruction should be given. For instance, instruction to the above could be; column A contains names used for the identification of some states in Nigeria, while column B contains some states in Nigeria. Select from column B the correct state for each of the identities in column A. indicate the letter representing the state against the correct identity in column A.

Matching items can be very useful if you are interested in testing the pupils' knowledge of association of pairs of facts like states ad capitals, authors and books, dates and events, symbols and names etc.

(c) Multiple Choice items:- This is the most common of the objective test items in use today. It is made up of two parts. The problem part which is stated either in the form of a direct question or an incomplete statement is known as the stem of the item. While a list of suggested solutions or answers are referred to the alternatives or options. The correct alternative or option is called the answer or the key. While the incorrect alternatives or options are referred to as the distracters. Their main function is to distract the uninformed examinee. There should be four or five options in a multiple choice item. For example.

i. Direct question form:

What is the name given to a plane figure bounded by five straight sides?

- A. Polygon B. Irregular Pentagon C. Regular Pentagon
D. Hexagon E. re-entrant Polygon

ii. What is the plane figure generated by an ellipse rotating on its axis for one complete rotation?

- A. Trapezoid B. Ellipsoid C. Trapezion D. Trapezium

2. Incomplete statement form:

i. A nine sided polygon is called _____

- A. Nonagon B. Octagon C. Decagon D. Heptagon

ii. Nigeria became independent in the year _____

- A. 1963 B. 1960 C. 1958 D. 1953

The multiple choice items are considered to be the most flexible and useful. It can be employed in the measurement of different types of learning outcomes ranging from simple to complex.

3.5 Guidelines for Writing Good Multiple Choice Items.

- i. Formulate the stem of the item so as to be very clear, meaningful and present a definite problem.
- ii. The stem should be as brief as possible
- iii. The stem should include as much of the item as possible and the alternatives should be as short as possible.
- iv. Each item should be formulated to test only one central idea.
- v. Make the distracters to look as plausible as possible.
- vi. Formulate each item in such a way that the alternatives are grammatically consistent with the stem.
- vii. Write the items in such a way that the reading difficulty and vocabulary level are as simple as possible.
- viii. Use natural order (numbers, dates, alphabets etc) to position the options.
- ix. Use negatively worded item stems sparingly. Where you must use negative words like 'no', 'not', etc make sure that you capitalize them or underline them to avoid pupils overlooking them.

- x. Avoid the use of 'all of the above' as an option. Again the option "none of the above" should be sparingly used.
- xi. The length of the alternatives should be relatively equal. This is to make sure that the length does not give clue to the correct answer.
- xii. For items testing definitions or the meaning of concepts, terms or words, you should try to have the definitions, concepts, terms or words in the stem.
- xiii. The keys to the items should appear at different positions (i.e. A,B,C,D) at an approximate number of times.
- xiv. There must be one and only one correct answer in an item.
- xv. There should be four or five options for each item.

3.5 Item Analysis

The test which you use for the assessment of the pupils in your class may not be subjected to item analysis. But if you decide to do an item analysis of your instrument, then you should first of all trial-test the items constructed with a sample of students that are quite similar to those pupils for whom the test is designed for. After the trial-test, you proceed to analyze the responses of the pupils item by item. This analysis will enable you to determine the difficulty index, discriminatory index and the distracters effectiveness. This item analysis will help you select the items which are very good to form your final test. You can get the details from your course in Measurement and Evaluation, EDU 426.

SELF ASSESSMENT EXERCISE

Select a topic in your subject area and set 10 objective items as follows: 4 supply types and 6 selection types. Provide the marking guide.

4.0 CONCLUSION

One of your major duties, as a classroom teacher is to set objectives, teach your pupils and assess them to see if the objectives are achieved. In order to be successful in this direction you have to be familiar with how to develop and use the test as a measuring instrument. This unit has given you the knowledge you require to be successful in the assessment of your pupils in the teaching-learning process.

5.0 SUMMARY

In this unit, you have learnt that the test is the most commonly used instrument for pupils' assessment in the continuous assessment system. For you to develop a test, you will have to plan for it, construct the items, following guidelines. In this unit, you learnt about the two types of tests, essay and objective tests. In essay test, we have the extended

and the restricted types. In the objective types, we have the supply items and the selection items. You have learnt the guidelines to follow when constructing the items.

6.0 TUTOR MARKED ASSIGNMENT

In your subject area, select a unit of lessons and construct 10 objective items and 2 essay items. Provide the marking guide. For each of the items set, indicate the specific type.

7.0 REFERENCES/FURTHER READINGS

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ANSWERS TO SELF ASSESSMENT EXERCISES

Exercise I

You are required to choose a topic of your interest and set 5 essay tests of our choice. Provide the marking scheme.

Exercise II

You are expected to select a topic in your subject area and set the 10 objective items. Provide the marking scheme.

UNIT 2.0 TESTS II

CONTENT

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Guidelines for Marking Essay Test Items
 - 3.2 Guidelines for Marking Objective Test Items
 - 3.3 Formative Evaluation
 - 3.4 Formative Evaluation and Continuous Assessment
 - 3.5 Remediation of Pupils Problem Areas
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Mark Assignment
- 7.0 References/Further Reading

1.0 INTRODUCTION

In the last unit, you studied the different types of tests namely objectives and essay tests. From the examples given, you have learnt how to set the items. These are the basic things you are expected to be doing as a teacher in the continuous assessment situation. We shall continue to learn more of these things in this course. Meanwhile in this unit, we shall be discussing the guidelines for marking the tests items and formative evaluation in a continuous assessment system.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- i. Explain the guidelines for marking essay test items
- ii. List the guidelines for marking objective test items
- iii. Describe formative evaluation
- iv. Discuss how to remedy pupils problem areas

3.0 MAIN CONTENT

3.1 Guidelines for Marking Essay Test Items

The following guidelines for marking essay tests will help to make your marking less subjective:

- i. **Marking Scheme:-** Before you start marking make sure you have the detailed marking scheme for each question. This will provide a common frame of reference for assessing each pupil's response or answer to the questions. This will help you to ensure that the standard of marking for each item is the same throughout in all the pupils' scripts.
- ii. **Mark each question separately:** Make sure that all the pupils' answers to one question are marked before going to the next question. This will help you to maintain a uniform standard of marking. It will also ensure reliability of the scores.
- iii. **You should mark the pupils' script without knowing their names.** This will help you to ensure objectivity in the marking.

3.2 Guidelines for Marking Objective Test Items

It is relatively easy to mark objective test items. It will be easier, if you apply appropriate techniques.

When your pupils are answering the objective items by shading the correct option on a separate objective answer sheets, you should use the scoring stencil to mark the papers. You will prepare this by using the same objective answer sheet and shading the correct options on the sheet. After this, punch holes on the shaded answers. When you place the perforated stencil on each pupils answer sheet, make marks on the holes. After this,

remove the stencil and count the number of shaded spots appearing through the holes of the stencil or corresponding with the holes. This will give you the score of the pupil. Before you start marking, it is very important that you check through the pupils' answer sheet to make sure that any item where more than one options are shaded will be crossed out before using the stencil. These days, there are computer made objective answer sheets. Anytime you have objective items for your pupils, try to use them.

3.3 Formative Evaluation

In the Nigerian school system, formative evaluation is very important and relevant to the continuous assessment practices. Formative tests are supposed to be administered to the pupils in the continuous assessment system as teaching-learning progresses. Formative tests can be described as the instruments primarily used for the continuous assessment of pupils learning in the teaching-learning situation. They are tests designed or developed and administered periodically to the pupils during the teaching learning process. They are used mainly for the monitoring of the learning progress of the pupils in particular and the teachers instructional strategies. The feedback from these tests can be used to assess both the pupils and teachers performance, the appropriateness of the curriculum and for diagnosing pupils individual problems. Formative tests are used by the teachers for the formative evaluation of pupils.

In this context, formative evaluation is regarded as the systematic and periodic evaluation of the pupils progress in learning during the instructional programme. The main focus of the formative evaluation is the improvement of the pupils learning through the provision of constructive feedback and remediation mechanisms. Again, formative evaluation also focuses on the improvement of teaching. It is used to provide reinforcement when successful learning takes place and to identify weaknesses that require remediation.

According to Bloom et al (1981) since formative evaluation takes place during the formation stage, efforts should be made to use it to improve the process of teaching/learning. We can rightly say that formative evaluation is very useful to the pupils. This is because it helps to pace their learning. It provides diagnosis to their learning difficulties and problems. It helps to provide reinforcement to their learning. It also helps to prescribe alternative remedial measures to their learning difficulties. Formative evaluation is also very useful to you as the teacher. This is because it helps you in locating specific difficulties which your pupils are experiencing in the subject matter content, quality control and prediction of summative evaluation results. For instance, through the feedback you get from the formative evaluation of your pupils, you should be able to say pupils X or Y may not be able to make it if the pupil is not given adequate remediation exercises. For an effective utilization of formative evaluation in the teaching learning process, Ughamadu (1994) recommends that the teacher needs to :

- (i) break up the subject matter content or course into smaller hierarchical units of instructions.
- (ii) Specify the objectives for each unit
- (iii) design and administer good formative tests
- (iv) offer remediation in groups or individually in the areas of deficiencies before treating a new unit
- (v) administer formative test after teaching all the units.

3.4 Formative Evaluation and Continuous Assessment

You have learnt in this course that continuous assessment among other characteristics is guidance oriented. This is because of the fact that data collected on any of the pupils or learners can be useful in guiding his further growth and development. You have to note that this guidance orientated nature of the continuous assessment is analogous to formative evaluation (Yoloye, 1978). You can see that both continuous assessment and formative tests or continuous tests in addition to feedback and remediation. The basis of operation for both of them is the predisposition to assist the learners to succeed in their learning. We can therefore conclude this section by saying that guidance oriented evaluation and formative evaluation are all integral aspects of continuous assessment.

SELF ASSESSMENT EXERCISE I

- i. What is formative evaluation?
- ii. What should the teacher do for effective utilization of formative evaluation

3.5 Strategies for Remediating Pupils Problem Areas

When you administer formative tests to your pupils regularly, there will be an improvement in their academic achievement. But this academic achievement is improved to a small degree if there is a prompt feedback and appropriate remediation which goes with these formative testing, there will be remarkable improvement in the level of the pupils academic achievement. In addition to this, if you motivate your pupils to putting more efforts at correcting errors revealed from the feedback resulting from these tests, you will have to record additional gain in the pupils academic achievement. When you want to administer a test for remediation of your pupils problem areas, a good strategy you can adopt is that of identifying the test items which majority of your pupils in the class answered incorrectly. According to Bloom et al, (1981) two thirds of the pupils or more can be used as an index to majority. Once these items have been identified, you than go ahead to review the ideas underlying the items. You can even explain them in details or explain them differently from the way they were originally explained to the pupils in the teaching-learning process. This strategy is what Ughamadu (1994) referred to as the group-based approach to remediation. Alternatively, you can review all the test items, but pay more emphasis or direct your emphasis to the particular items which majority of the pupil in the class had problem with. You can also make references to specific pages of their text books, class notes or other relevant instructional materials for the pupils to consult in their further reading.

There is yet another method. This method is the one which Bloom et al, (1981) considered as the most effective procedure for remediation. It requires that you have small groups of two or three pupils to meet for a period of about 30 minutes or more to review their level of performance after every formative test. For this method to work effectively, pupils in a group can help each other to overcome the areas of the test that posed problem to them. However, as a result of the high pupil-teacher ratio in our school system these days, the number of pupils in a group could be increased to be more than three. You have to use your discretion in this case.

In some cases and wherever possible, you can also offer individualized attention to some pupils. This will be very good for some pupils who may not be following the learning – teaching process or those who are slow learners. It is the expectation of the system that there will be an improvement in the pupils learning and academic achievement, if the pupils are exposed to regular formative testing with remediation in this era of continuous assessment in our school system.

4.0 CONCLUSION

This unit is a follow-up to the last unit where you studied tests and the different types of test items. You have seen that formative evaluation and continuous assessment go hand in hand, though most of the times, they are used interchangeably. The most important aspects of these is the use of the feedback from the formative testing in order to give effective remediation to the pupils. This will definitely improve the pupils learning and academic achievement.

5.0 SUMMARY

In this unit, you have learned how to mark essay test items so as to make the marking less subjective. You also learnt that to mark objective items shaded on objective test sheets, you have to make use of stencils. In this unit also we discussed the formative evaluation and said it makes use of formative tests which are tests designed or developed and administered periodically to the pupils during the teaching learning process. You also learnt the relationship between formative evaluation and continuous assessment. You learnt that formative evaluation is an integral part or aspect of continuous assessment. You have seen the strategies provided for you, for the remediation of your pupils' problem areas.

6.0 TUTOR MARKED ASSIGNMENT

- i. What is formative evaluation?
- ii. How would you use formative test to remedy your pupils problems?

7.0 REFERENCES/FURTHER READING

Bloom, B.S. et al (1981). Evaluation to Improve Learning. New York. McGraw-Hills Book Company.

Ughamadu, K.A. (1994). Understanding and Implementing Continuous Assessment. 2nd Ed. Benin City, World of Books Publishers

ANSWER TO SELF ASSESSMENT EXERCISE

- i. Formative evaluation is the systematic and periodic evaluation of the pupils progress in learning during the instructional programme
- ii.
 - (a) break up the subject matter content into small hierarchical units of instruction
 - (b) Specify the objectives for each unit
 - (c) design and administer good formative tests
 - (d) offer remediation in groups or individually in the areas of deficiencies before treating a new unit
 - (e) administer formative test after teaching all the units.

Unit 3.0 PROJECTS AND ASSIGNMENTS

CONTENT

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Projects
 - 3.1.1 Project activities
 - 3.1.2 Skills and abilities developed by pupils through projects
 - 3.1.3 Issues associated with the use of projects
 - 3.2 Problems with Project Evaluation
 - 3.2.1 Teacher participation
 - 3.2.2 Product versus process
 - 3.2.3 Group projects
 - 3.2.4 Availability of adequate material resources
 - 3.3 Assignments
 - 3.3.1 Pupils' involvement in assignment

3.3.2 Purposes of assignment

- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignment
- 7.0 References/Further Reading

1.0 INTRODUCTION

This is yet a continuation of the last two units. In this unit, you are going to see more of the instruments and techniques that can be used in the continuous assessment system. You may decide to use them in combination in other to improve the academic achievement of your pupils and to provide variations in the assessment. This will also make the continuous assessment programme more comprehensive.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- i. Explain the use of projects in continuous assessment
- ii. Discuss the activities involved in the use of projects
- iii. Mention some important issues in the use of projects
- iv. Describe the problems in evaluation of projects
- v. Explain the meaning of assignment
- vi. Mention the purposes of assignment.

3.0 MAIN CONTENT

3.1 Projects

As said in the introduction, you have seen tests are the most commonly used instruments for measurement of pupils academic activities in the primary school system in particular and in our educational system in general. In the continuous assessment situation, another significant instrument for the measurement of the pupils level of academic achievement is the project. Project is very important in the continuous assessment situation, because it can be used for the assessment of all types of behaviours like cognitive, affective, and psychomotor domains. It can be considered as an integrative instrument. This is because a single project could be used for the measurement of behaviours in all the three domains. Let us describe a project as a task or large-scale exercise assigned to the pupils which they may work on over an extended period of time. You have to note that time constraint is not much of a problem in project work. An assigned project work can span over a period of one month, a term or even an academic year or session. A project work or task is expected to perform two major functions. These are (i) helping the pupils to learn through problem solving (ii) it provides you as the teacher the opportunity or basis for assessing the pupils learning originality, creativity or creative thinking ability. Projects can also be useful in the assessment of some aspects of affective behaviour like interest,

and also the display of some manipulative skills in the psychomotor domain can be assessed through some projects.

3.1.1 Projects Activities

Some activities which are involved in project tasks are:

- i. Allowing pupils to carry out open-ended experiments in the school laboratories or workshops
- ii. Data collection and analysis:- Pupils can be asked to collect and analyze information on a variety of subjects and issues. For instance, they can be asked to collect information on the 'Mbomuzo' festival or 'Iri ji' festival from the East, the 'Eyo' festival from Lagos, Argungu festival from the North, etc. Information in respect of Sallah or Christmas for the Muslims or Christians could also be collected and analyzed.
- iii. Pupils can be allowed to study a type of habit over a period of time.
- iv. Making of models or moulds of objects:- Pupils can be assigned to make models of three dimensional objects or geometrical shapes and figures. They can be assigned to make moulded illustrations of some physical features of the country.
- v. Pupils can be asked to identify and attempt to solve or find solution to some or certain persistent problems in a community or a field of learning. Such problems like indiscriminate dumping of refuse, leaving bushy and unkempt road sides, keeping the streams or water reservoir surroundings very dirty etc., or such problems like poor performances of pupils in Mathematics or Science subjects among pupils etc. the pupils can identify these problems with a view to collecting information on how to find solutions to such problems.
- vi. Pupils can be asked to investigate underlying concepts and principles. This can get the pupils involved in selecting a concept or principle and carrying out a research study with a view to proving or disproving the applicability of such principle or concept.
- vii. Pupils can be asked to draw plans for a model school, building, market town hall etc.
- viii. Pupils can be asked to make systematic observation and recording of particular events. For instance, they can be asked to observe and record information on the rate of rain fall in a particular environment like the school compound, the rising and setting of the sun, the germination and growth of a named plant etc. this will take place over an extended period of time.

You can see that from the list of possible projects which your pupils can engage in, we can conclude that the extent of the complexity varies. Some can be carried out by young learners, while others would be better carried out by more matured learners. Projects can be carried out in individual or group basis. It will depend on the extent of complexity of the project or the time available for carrying out the projects. Therefore, when you as the teacher assigns projects to your pupils or you want the pupils to pick up a project for execution, you should have some purposes or objectives in mind. In other words, when

you ask your pupils to set out for a project, you will obviously have some stated objectives which you intend to achieve using the execution of such projects.

3.1.2 Skills and abilities developed by pupils through projects: It is expected that when pupils carry out projects, they will develop some of the following skills and abilities (Ughamadu 1994:44):

- i. Construct the particular equipment in a proper way
- ii. Set up the particular equipment in a proper way
- iii. Recognize the optimum conditions necessary for life in fresh water
- iv. Identify and provide the type of food the fish eats/apply their knowledge of nutrition of aquatic animals like fish.
- v. Observe and record daily the life pattern of the fishes in the aquarium
- vi. Recognition of a good chain in a secluded fresh water
- vii. Appreciate the economic importance of fishes.

When you take a close study of these objectives, though they are from a particular subject areas, you will notice that they span the three domains of behaviour. You remember, we have earlier said that projects can be used to cover behaviour in all the three domains.

3.1.3 Issues associated with the use of projects.

There are some important issues which you need to know that are associated with the use of projects. These are:

- i. The degree of the teachers participation in the project should be considered especially because the pupils are not to be given credit for the input of the teacher.
- ii. Pupils develop originality and creativity by executing projects
- iii. The whole process involved in carrying out a project and the product should be assessed during assessment of the project.
- iv. The project which you assigned to our pupils or selected by the pupils should be directed to the immediate environment of the pupil so that resource materials will be easily available.

All the criteria to be used for the award of marks to pupils who participate in a group project should be properly worked out in advance. Now take note of these useful guides to steps in the use of projects for the evaluation of projects. These include:

- i. Identification of the general purposes for the project work.
- ii. Breaking down the basic purpose into specific objectives in the three domains of behaviour.
- iii. Assigning priorities to each of the objectives as to enable evaluators know the emphasis.
- iv. Determination of the degree of penetration desired for each objective.

SELF ASSESSMENT EXERCISE I

- i. Identify some projects which will be assigned to primary six pupils.
- ii. Specify the objectives you intend to achieve by this project.
- iii. Specify how you intend to assess the projects when they are completed.

3.2 Problems with Project Evaluation

It is a very important learning experience for pupils to be involved or participate in project work. It is also important that you note that some problems may be associated with the evaluation of projects.

3.2.1 Teacher Participation:- When a project is assigned to the pupils, it is a common knowledge that these pupils execute the project under the guidance and direction of the classroom teacher. The pupils usually consult their teacher. The teacher offers very necessary advice and direction for pupils to be successful in the execution of the project work. It means that you as a teacher will play the role of a planner and consultant. When the project is completed, you will also play the role of an assessor. You can see that these three roles are interdependent. Therefore, a problem arises from these roles of the teacher. It means you have invariably participated in the project. The first problem is to

determine how much of the final result of the project is due to the pupils, or a group of pupils. Again, you can see that it is very difficult to isolate exactly what work belongs to the pupils and the ideas that are yours as the teacher. Your participation in the project work is inevitable, so the final assessment of the project can be considered as much a measure of the teacher as well as that of his pupil. This is the issue that presents problems to the objective evaluation of projects. You have to be aware of this so as to take it into consideration when you are evaluating your pupils project.

3.2.2 Product versus Process: In our school system, when teachers assign projects to their pupils, and when the project are completed, teachers tend to evaluate the final outcome of the projects or the finished product. They do not take consideration of the whole processes which must have been imputed into the execution of the project. This is not a very good approach to assessing the project. This fault is very similar to the previous evaluation of pupils academic achievement based on one-shot examination that did not take into consideration the progress made by the pupils before the final examination. You should obviously put into account the efforts, interest, value, persistence, tolerance, appreciation, creativity, originality, mode of attacking the problem etc. as worthwhile behaviour characteristics that should be recognized by the teacher. All of these and more are elements and characteristics to be evaluated in addition to the finished or final product. You can assess the processes involved in the execution of a project by having consultation with the pupils while the execution of the project is in progress.

3.2.3 Group Projects:- Most of the times, pupils are assigned projects in groups. Group projects posses a big problem for the teacher as an assessor. The inherent difficulty in this case is for you to identify or know each pupil's contribution in the completed project. It is very much possible that in group projects some pupils may be active participants while some others may not have done enough. Here lies the problem. Most teachers use this as an excuse for not using projects in the assessment of their pupils. If you want to use the project for the assessment of the pupils especially in the continuous assessment, you should consult with the pupils. By doing this, you will note the type of questions raised by each pupil, the pupils comments and then the responses of the pupils to your own questions.

3.2.4 Availability of Adequate Material Resources: This can be a very serious problem in the execution of a good and quality project. Pupils may require raw materials for designing a project but may not be able to get them; pupils in the rural areas may not be able to collect enough magazines, newspapers, cardboard papers etc. from which to get cut-outs for preparing an album of animals, rulers, priests, etc. These pupils in the urban owns may not be able to get the required quantity of materials like palm fronds, fruits, roots etc. which may be necessary for the execution of a specific project. It means therefore that you need to consider the availability and ease of getting the material resources before you assign the project to the pupils and in evaluating the projects.

Anytime you want to use projects in assessing your pupils, you should give considerable attention to these problems. You should also consider them when you want to evaluate

the projects. However, a factor of primary importance is the main purpose of the project under consideration. For instance, some of the knowledge, skills, interests, abilities, attitudes, values, feelings, etc. which you would wish to have in your pupils may be achieved through the execution of the assigned projects. These are essentially derived and clearly state the objectives of any project at the planning stage in order to increase the objectivity in the evaluation of the projects.

SELF ASSESSMENT EXERCISE 2

What are the problems associated with evaluation of projects in the primary schools?

3.3 Assignments:- When you give some specific tasks or work to your pupils, to be completed within a specific period of time, we say you have given them assignment. So an assignment can be considered as an extension of class activity or a fore-runner of a class activity. Assignments can be said to be similar to projects. This is because both are expected to provide an opportunity for learning as well as a basis for assessment. When you give an assignment to your pupils, they have the opportunity to consult books, people etc. for help if need be. However, assignments usually require shorter and limited time than projects. They can be done anywhere, at home, classroom, laboratory, library or any place where the pupil finds convenient.

3.3.1 Pupils Involvement in Assignment

Assignments may involve the pupils in the following:

- i. Collecting specimens or objects
- ii. Checking on some information in the library
- iii. Writing an essay or a report on an activity or a current event
- iv. Completing a drawing or other forms of illustration
- v. Observing and recording some events, activities or phenomena
- vi. Solving quantitative problems in mathematics and science subjects
- vii. Reading a passage to collect specified information.

Note that whatever the nature of the assignments given to the pupils, it is very important that you provide prompt feedback to them. In our school system, some teachers give assignments to pupils as a form of punishment, some of them who are unable to cover the syllabus or scheme of work, or those who are not familiar with some aspects of the syllabus or scheme of work may resort to give the topics not treated or the ones they are not familiar with as assignments to the pupils. The worst part of it that these assignments are not marked. When teachers use assignments in this way, it results in pupils developing negative attitudes towards assignments.

3.3.2 Purposes of Assignments

When you use assignments in a proper way, they can serve the following purposes:

- i. Providing the pupils the opportunity for both independent or individualized and group activities. Assignments provide the pupils the opportunity to direct their own study.
- ii. Keeping the pupils meaningfully occupied in class when the teacher is unavoidably absent or meaningfully occupied at home.
- iii. Contributing to the assessment in the cognitive, affective and psychomotor domains of behaviour. For instance, if the assignment involves drawing an object, we may use it to assess all the domains of behaviour.

In addition to the above purposes, home assignments can be used to help reduce the amount of work to be covered in the class. This provide more time for such other activities as remedial teaching. To make assignments very effective as to serve these purposes, you as the classroom teacher should carefully do the preparation and evaluation of the assignments. A careful preparation of assignments will require that you state or identify the objectives for the assignments. Use the stated objectives to work out criteria for the assessment of the assignments. When you have marked the assignments any score made by the pupils should be made known to them. The results from such assignments should be incorporated in the overall evaluation of the pupils works in the school. When you use assignments in this way the pupils will be motivated to take their assignments as serious and important as a means of teaching-learning and assessment.

SELF ASSESSMENT EXERCISE 3.

In your subject area, design an assignment for your pupils. List the objectives for giving this assignment and list the assessment criteria for this assignment.

4.0 CONCLUSION

You have added yet another two instruments and techniques for yor use in the continuous assessment programme. In your practice as a teacher, you are free to use them in combinations or at different times or occasions in order to make for variety and to make continuous assessment comprehensive. Again, it will help you to assess all the three domains of behaviour. In the next unit we shall continue with the other instruments and techniques.

5.0 SUMMARY

In this unit, you studied the project and assignments as instruments and techniques used in the continuous assessment system. You were told that a project is a task or large-scale exercise assigned to pupils which they may work over an extended period of time. You learnt about different types of project activities that you can assign to your pupils, how pupils are involved in the skills and abilities to be developed in pupils. You also studied the issues associated with the use of the projects and availability of adequate material resources.

Under assignments, you learnt how pupils can be involved in the assignments, purposes of assignments etc. In the next unit we shall continue with other instruments and techniques.

6.0 TUTOR MARKES ASSIGNMENT

1. What is project?
2. What are the problems associated with project evaluation?
3. Design a good assignment for your pupils and state the objectives and marking criteria.

7.0 REFERENCES/FURTHER READING

Ezewu, E.E. and Okoye, N.W. (1981). Principles and Practice of Continuous Assessment. Ibadan. Evans Publishers.

Ughamadu, K.A. (1994). Understanding and Implementing Continuous Assessment. 2nd ed. Benin City. World of Books Publishers.

ANSWERS TO SELF ASSESSMENT EXERCISES

Exercise 1

Students are expected to do that on their own.

Exercise 2

The problems are:

- i. Teachers participation
- ii. Product versus Process
- iii. Group Projects
- iv. Availability of adequate material resources

Exercise 3

Students should be able to do that on their own.

UNIT 4.0 OTHER INSTRUMENTS AND TECHNIQUES

CONTENT

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Observation
 - 3.1.1 Guidelines for systematic observation
 - 3.2 Check List
 - 3.3 Rating Scale
 - 3.4 Anecdotal Records
 - 3.5 Interview
 - 3.5.1 Useful guide in conducting interviews
 - 3.6 Questionnaire
 - 3.6.1 Steps in constructing a questionnaire
 - 3.7 Socio-metric Technique
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignment
- 7.0 References/Further Reading

1.0 INTRODUCTION

This unit is yet a continuation of the last units. You have been studying the instruments and techniques used in the continuous assessment programme. You as a classroom teacher going to implement the programme should be able to understand how to use all these techniques. So in this unit, you are going to study the remaining instruments and techniques.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- i. explain systematic observation in continuous assessment
- ii. design a checklist for use in the class
- iii. describe a rating scale
- iv. explain how to use anecdotal records
- v. describe the use of interview
- vi. design a questionnaire that can be used in the class
- vii. explain socio-metric technique

3.0 MAIN CONTENT

3.1 Observation

Observation has been in use as a technique for collecting data or information since the olden days. Almost all the teachers are familiar with it. But it is not systematically used. What is mostly used in our school system is the casual observation which is not enough if one has to place some confidence on the information got through observation. If you have confidence in the information you have collected on your pupils, you will be better disposed to include such information in the pupils reports. Therefore, we need to have systematic observation in which pupils are observed in an organized manner. You can watch and study your pupils behaviour systematically. When observation is systematic and organized, it becomes an appropriate technique that can be used for the assessment of both affective and psychomotor behaviours. Before we continue let us define observation as the act of looking out for and recording the presence or absence of verbal and non-verbal behaviour of a person or group of persons. The use of specially designed evaluation instruments to collect observational data is referred to as observation technique.

3.1.1 Guidelines for Systematic Observation

If you want to conduct a systematic observation that will yield an information which can be relied on, follow the following guidelines:

- i. identify the quality or behaviour to be observed e.g. leadership quality.
- ii. determine the appropriate behaviour that characterizes the identified quality
- iii. determine the appropriate activities that can make the pupils display the quality. It means that you will have to create a situation in which such behaviour or quality will be displayed. This as a process is referred to as manipulative situational technique. It is a method of observation. For instance, you can test the honesty of your pupils by dropping some money or anything that is attractive at a place where it can be easily stolen. You can then observe whether or not the pupils will remove the money or the item. Some of the times you can observe behaviours in their natural occurring situation or natural setting.
- iv. determine methods of observation. You can have direct observation in which you carry it out yourself, you can use trained observers or you can employ the use of electronic recording devices.
- v. observe the pupils in different situations so as to ascertain the regularity or establish the regularity of such behaviour in order to get a reliable and valid data.
- vi. devise a method of recording the observations made.

At this juncture, you should note this important fact that the use of systematic observation as an instrument for the assessment of the pupils behaviour and the success in its utilization depends to a great extent on certain factors. These factors hinge on the extent to which teachers biases and prejudices, his powers of perception and the accuracy with which the results of observations made are recorded.

3.2 Checklist

Checklist as an instrument essentially consists of a list of steps, activities, events, behaviours or statements associated with given behaviour traits which the observer records when such incident is noticed or occurs. If you are using the checklist, you will be able to determine whether or not particular behaviour traits or characteristics are present or absent. A checklist may not permit you as the observer to rate the quality of, degree to which, or the frequency of occurrence of a particular behaviour. But it can be used effectively in the assessment of affective and psychomotor behaviour. You can use the checklists in most subject matter areas. It can be very useful in the assessment or make evaluation of learning activities especially those that involve product, process and some aspects of personal-social adjustment. Checklist can be more useful in the evaluation of processes which can be sub-divided into a set of clear, distinct and separate actions as in the use saws in the workshop, welding, casting, drawing or the use of thermometer etc. when you make use of a properly prepared checklist, you will notice that your attention will be focused to the clearly defined characteristics or traits. It will also permit different individuals who used the same instrument to compare their results on a common list of characteristics or traits and provide a very simple and definite method of recording observation. For you to construct a test in your subject area, see the checklist below as an example.-

- i. Specify instructional objectives in measurable terms
- ii. Specify the content area to be covered
- iii. Prepare a table of specification
- iv. Determine the test item type to be used
- v. Construct the test items
- vi. Trial test the instrument
- vii. Carry out item analysis
- viii. Edit the items
- ix. Prepare the marking scheme
- x. Update the instructions

Now look at the checklist below for assessing pupils drawing attitude:

- i. Correct type of pencils
- ii. Pencils correctly sharpened
- iii. Correct drawing paper
- iv. Drawing paper neat
- v. Drawing paper well placed
- vi. Correct drawing board
- vii. Correct eraser

- viii Correct sharpner
- ix Other materials in use
- x Correct use of the materials
- xi Maintains neat drawing
- xii Correct concentration

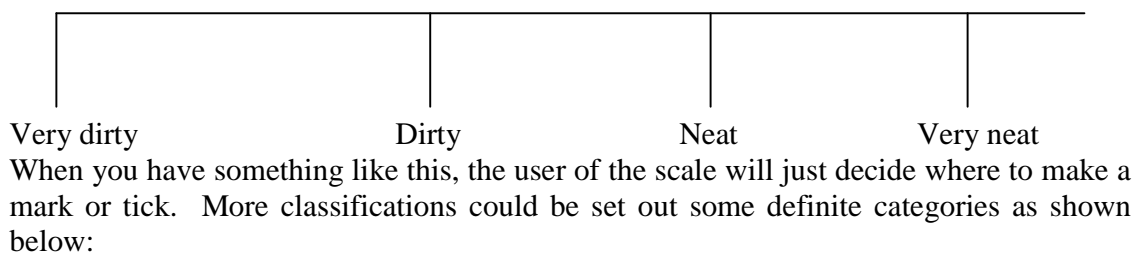
When you have this type of checklist, all you need to do is to tick when you notice the incidence. It is important that you use the checklist when you are interested to ascertain the presence or absence of a particular behaviour or trait or characteristics. Note that the trait to be observed must always be specified so that observation is confined to only these points specified in the checklist.

SELF ASSESSMENT EXERCISE I

Make a checklist for assessing your pupils cleanliness

3.3 Rating Scale

This involves qualitative description of a limited number of aspects of a thing or of traits of a person. It is similar to checklist, but is more useful when finer discriminations are to be made. You noticed that in the checklist, you are expected to indicate just the presence or absence of a trait, behaviour or characteristic. With the rating scale, you are expected to show the degree of presence or status or quality of what is being rated. From all these, you will note that the major difference between a checklist and rating scale is that a checklist requires that you only indicate the presence or absence of a behaviour, characteristic or trait. It means therefore that an item in a checklist can be converted to an item in a rating scale. For instant, if you take up item iv in the checklist, where we have – Drawing paper neat – To this effect, we can ask questions. To what extent is the drawing paper neat? You need to provide a scale for rating. This we have



When you have something like this, the user of the scale will just decide where to make a mark or tick. More classifications could be set out some definite categories as shown below:

- i. Superior, Above average, Average, Below average, Poor
- ii. Excellent, Very good, Average, Below average, Poor
- iii. Always late, Frequently late, Occasionally late, Rarely late, Never late

For you to use the rating scale effectively, you have to define very carefully in observable or behavioural terms, the traits, behaviours, characteristics, or categories for observation.

3.4 Anecdotal Records

This is yet another simple technique which you can use for the assessment of affective behaviour of your pupils. It can be described as a brief written description of some specific behaviour in the day to day life of a pupil as observed by the teacher or the researcher. In other words, they are records of specific incidents of the pupils behaviour, over a period of time. So you can now see that anecdotal records can provide you as a classroom teacher, with a longitudinal picture of changes that have taken place in a particular pupil. This is done in such a way that any person who wants to read through a pupil's anecdotal records can use it to make an assessment of the typical behaviour of the pupil. At this juncture, you have to note that anecdotal records are normally restricted for use in the area of social adjustment. It is regarded as an informed technique. This is because there is usually no pre-meditation about observing the particular pupil. What may happen is that you as the teacher will observe the pupil and record objectively any striking behaviour on a card or any other device. This is done for sometime without any explanation or judgement of the behaviour. These are some of the characteristics of anecdotal records:

- i. they should contain factual description of what happened and the circumstance under which the behaviour occurred.
- ii. Each anecdotal record should contain just a record of one incident
- iii. Any incident recorded should be one that can be considered as significant to the pupils growth and development.
- iv. Any interpretation and recommendation action should be separated from the description (Ughamadu, 1994).

3.5 Interview

This is used to gather information regarding an individuals experience and knowledge, opinion, beliefs, feeling and demographic data. Questions are asked to obtain or determine past or current information as well as predictions for future. It is a technique by which relevant information is obtained from a person through direct oral questioning of a conversational nature. This information may be about the interviewee or another person or event. If you use the interview technique in your class, you can obtain information about the affective behaviour of the pupils. With the interview technique, you can get to know much about the pupils' interest, family background, relationship with teachers and classmates, participation in school and community activities. You can pose some oral questions to the pupils and based on their responses, you can probe further until you obtain the required information in details. You have to have a skill in the interview process. This is because some of the times, you have to manipulate and prompt your respondents into revealing very useful information. From the way some pupils respond to the interview questions, you can have insight into the behaviour of such pupils.

In your basic research methods, where these techniques were explained in details, you were told that there are two major types of interviews patterns. These are structured and unstructured. Structured interviews use interview schedules which contain series of questions to be asked in a particular order. It means that you as the interviewer cannot

deviate from the questions as specified and in the order to which they are specified. The unstructured interview has no limitation in terms of scope or the number of questions to be asked or the order of asking them. It allows you to probe further in order to obtain more or additional information. It is much more time consuming than the structured interview because you need to probe deeper so as to get more information.

3.5.1 Useful Guide in conducting interviews:

- i. Define the objectives and plan of the interview in very clear terms. You should do this in advance and should include the necessary lead questions.
- ii. Try as much as possible to create a friendly atmosphere throughout the period of the interview.
- iii. Always have written notes about important answers.
- iv. Cross check the respondents answers through the use of other techniques. This is to avoid the use of fake information which may be supplied by the respondents. Some subjects may have the faking tendency while others give fake information due to ignorance.
- v. Occasionally, employ guide questions to re-direct the respondents or to elicit the relevant information when the subject drift away from the area of paramount importance.
- vi. Avoid arguments with your interviewee and do not get involved in very touchy or sensitive issues.

As a teacher, you may not have received any training as an interviewer, but you should aim at successful interviews with your pupils by practicing all the time, there will be continuous improvements.

SELF ASSESSMENT EXERCISE 2

- i. What is an interview?
- ii. What are the types of interview
- iii. Prepare a rating scale on any 5 items of cleanliness of pupils.

3.6 Questionnaire:

This is an instrument which consists of a set of questions that are presented in written form to a respondent who is expected to answer the questions in writing. It is mostly employed in survey researchers for a large number of subjects at the same time. In the school system, you can use it effectively to collect information on opinions, attitudes, interests etc. it is a self reporting instrument. Like the interview, the questionnaire can be of two types. These are the structured or closed-ended and the unstructured or open-ended. The closed ended questionnaires are called restricted type because it calls for short, check, tick, mark answers. The questions are such that you can only answer yes or no, true or false, or choose the correct option from a number of options available. The open ended questionnaire gives the respondents freedom to answer the questions in their own way and their own words. There is no restriction. You can use the questionnaire to

get information relating to your pupils study habits, personality characteristics, feelings, etc.

3.6.1 Steps in constructing a questionnaire:-

- i. Identify the objectives and specific information to be obtained
- ii. Select a response format
- iii. Identify the frame of reference of the respondents
- iv. Write the items/questions
- v. Prepare a data summary sheet
- vi. Critique the questions, typing them out and revising them
- vii. Assemble the questions
- viii. Administer the questionnaires

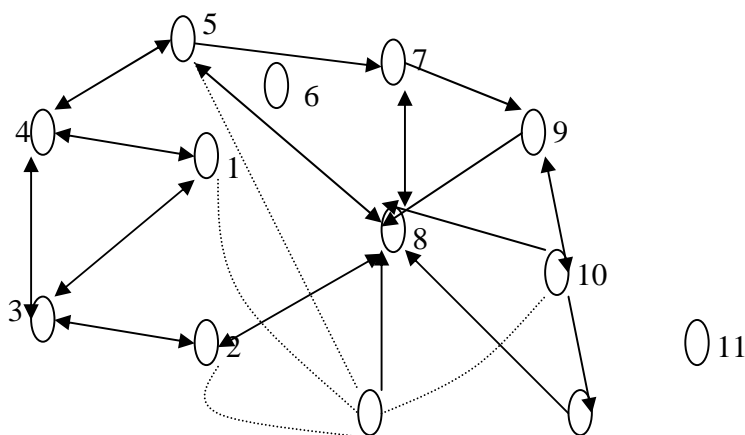
3.7 Socio-metric Technique

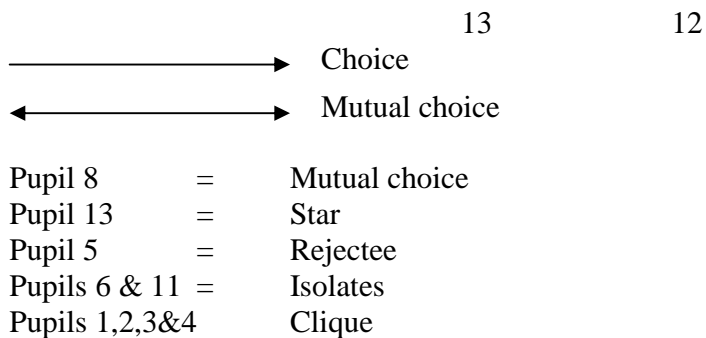
This is a technique for assessing some aspects of non cognitive behaviour of the pupils. It is the study of interrelationships among members of a group or a class. It can be used to determine the type of relationships that exist among members of the group. In a classroom situation, it can be used to assess the social acceptance of the individual pupils in the class and thereby their personal qualities. This is mainly based on pupils choices of companions for some group activity. For instance, pupils can be asked to do the following in writing:

- i. Name your choice of best friend in the class.
- ii. Name the pupils you would like to work with in a group project.
- iii. Indicate the pupils you would not like to work with at all.

The choices and rejections made by the pupils are analysed and they tell a lot about pupils nominated or not nominated. The most chosen pupils or members of the group are called stars. Those who do not choose anyone and are chosen by anyone are called isolates. A person who receives only one choice is a neglectee. If a person receives only rejection choices, he is called a rejectee. Pupils among whom there are mutual choices, that is, those who choose among themselves, constitute a clique.

Socio-metric choices describe the existing flow of interaction and relationship among pupils. A sociogram is a diagram or visual representation of the socio-metric choices within a group.





In using the socio-metric technique, you have to note that information obtained from one occasion can be true for that occasion only and for a particular basis of choice. If a different basis of choice is given to the pupils, the pattern shown in the sociogram may likely change completely. Again, a different pattern can also emerge with the same basis of choice at another time. This means that the pattern of social relationship in a class is not constant for all the time.

SELF ASSESSMENT EXERCISE 3:

Construct a questionnaire of 10 items for use in determining the interest of your pupils practical agriculture.

4.0 CONCLUSION

Most of the times, it is not reliable to assess affective and psychomotor behaviours of the pupils with the usual cognitive paper and pen tests. Instead, these behaviours are measured effectively with instruments which are non-cognitive in nature. Some of these instruments as you have seen are not concerned with measuring what or how much the pupils know rather they measure personality traits or characteristics which determining the affective and psychomotor behaviours of the pupils. Most of the techniques you have studied in this unit belong to these categories. You can select any one or combination of them in your continuous assessment of your pupils.

5.0 SUMMARY

In this unit, you are able to learn many of the instruments and techniques used in continuous assessment programme. You were told that observation is the act of looking out for and recording the presence or absence of verbal and non-verbal behaviour of a person or group of persons. You saw the guidelines for systematic observation. Checklists, Rating scales, anecdotal records, interview Questionnaire and sociometric techniques were all treated.

6.0 TUTOR MARKED ASSIGNMENT

- i. Construct a checklist for assessing the pupils behaviour in a games period.
- ii. Convert the items in the checklist to items in a rating scale.

7.0 REERENCES/FURTHER READING

Obimba, F.U. (1989). *Fundamentals of Measurement and Evaluation in Education and Psychology*. Owerri, Totan Publishers Ltd.

Ughamadu, K.A. (1994). *Understanding and Implementing Continuous Assessment*. 2nd ed. Benin City. World of Books Publishers.

ANSWERS TO SELF ASSESSMENT EXERCISES

Exercise 1

Students should be able to prepare the checklist.

Exercise 2

- i. An interview is a technique by which relevant information is obtained from a person through direct oral questioning of a conversational nature.
- ii. The two types of interview are Structured and Unstructured.
- iii. Students should be able to prepare a rating scale of 5 items.

Students are expected to construct a 10-item questionnaire.

MODULE 3.0: RECORDS, ADMINISTRATION AND PROBLEMS

- UNIT 1.0 Record Keeping
- UNIT 2.0 Grading, Interpreting and Reporting of Evaluation Results
- UNIT 3.0 Administration of C.A.
- UNIT 4.0 Problems and Prospects

UNIT 1.0 RECORD KEEPING

CONTENT:

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Types of Records
 - 3.1.1 Teachers Class/School Records
 - 3.1.2 Pupils Record/File
 - 3.1.3 Transcript
 - 3.2 Guidelines for Record Keeping
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignments
- 7.0 References/Further Reading

1.0 Introduction

A very important aspect of the continuous assessment programme in our educational system is record keeping. Records of the pupils academic achievement and their non-academic achievements must be properly kept. We have already said that continuous assessment is cumulative, guidance oriented among other characteristics. If records are properly kept, it will be of immense benefits to the head-teachers, teachers, pupils, school counselors and parents. This is because, well-kept records will help anybody at any point in time to determine whether a pupils is making progress or not. In other words, the strengths and weaknesses of the pupils can be identified so that appropriate remediation of the given. Again, good record keeping can facilitate the continuity of assessment for some pupils who may want to change from one school to another as a system result of some obvious reasons. In t his unit, you will learn more about record keeping in the school s

2.0 Objectives

At the end of this unit, you should be able to:

- i. Describe the different types of records
- ii. Explain the guidelines for good record keeping

3.0 Main Content

3.1 Types of Records

In the implementation of the continuous assessment programme different types of records are expected to be maintained in the primary schools. Among others, these include (a) teachers class/school records (b) pupils cumulative record file or folder (c) the transcript. Let us look at them one after the other.

3.1.1 Teachers Class/school Records

This is one of the permanent school records which you are expected to keep as a classroom teacher. Examples of such school records are:

- i. **Detailed Scheme of Work:** This essentially is a breakdown of the syllabus showing what the classroom teacher intends to cover from week to week is therefore organized or arranged in weeks on termly basis. In other words, the terms work is broken down into units that can be covered within a week so each term is arranged in weekly units. With this arrangement, you should be able to know what you are to teach at any particular period.
- ii. **Dairy of Daily Record of Work:** This contains the actual work covered for each week. All the learning experiences which your pupils passed through including the evaluation strategies given to the pupils during the week are all indicated in the dairy.
- iii. **Progress Report:** In this, you have a comprehensive and systematic record of all the performances of the pupils. All the pupils academic achievement in class tests, assignments, projects and other assessments in the non-cognitive domain should be recorded in this progress report. This progress report, no doubts is one of the most important aspects of the teachers class records in the implementation of the continuous assessment programme. It is designed to make provision for:
 - (a) Weekly, monthly or periodic records of the pupils achievement.

- (b) Broad summaries of the students progress at such intervals as prescribed by the particular school. This is done usually at least twice in a term.
- (c) Terminal progress reports which incorporates both academic grades/scores and also scores and grades in social development and manipulative skills.

These records are expected to be maintained at all levels of the educational system. But it is very compulsory in the primary schools. There may be some modifications depending on the school.

3.1.2 Students Cumulative Record File:

This is a file which is maintained in the schools. It contains all the relevant and necessary information of the pupils. It is kept on an annual basis throughout the period of the pupils stay in the particular school. The information kept covers the entire six year period of primary school education. This file is said to be cumulative because every pupil is expected to have the file maintained for him throughout the primary school period. This cumulative record file should at any time give information on the following areas:

- i. Personal information about the pupil
- ii. Period report of the academic achievement of the pupil. The modalities for doing this is always prescribed by the school.
- iii. Report of each term's examination
- iv. Report of social and physical developments/activities.
- v. Yearly summary of progress. This should also include the weightings (Ugliamadu, 19940).

The cumulative record file is very useful in the same that with all the information recorded, any parent or guardian will be adequately and properly informed about the progress of his child or ward. Thus, at a glance, you can make a comparison of the pupils progress at different periods of his stay in the school. This is because al the information required are accumulated in the file.

3.1.3 Transcript

This is usually a report which is given to pupils who may wish to change or transfer from one school to another. It contains the cumulative scores of such pupil in the three domains of behaviour since, continuous assessment is cumulative and practiced almost in the same way in every school, pupils cumulative scores from one school should be relevant in his new school. This academic achievement scores are the most important

scores and are recorded in the form of standardized scores called T-scores and the percentile ranks. Never mind we shall explain these in the last module of this course. A typical transcript contains the following:

- i. The termly summaries: This is the average of scores the periodic tests for the respective halves or thirds or quarter of each term. But most schools do the summaries twice in a term.
- ii. The end of term examination scores and results.
- iii. Scores in the affective and psychomotor domains.

The format of the transcript is not exactly the same in all the states. There exist some little variations from state to state. Note the following points about records:

- i. All school records should be systematic, cumulative and comprehensive.
- ii. All school records should be kept in such a way that they should be easily understood by anyone who will need to use such records
- iii. All school records should be confidential, but should be easily accessible to any one authorized to see them.

SELF ASSESSMENT EXERCISE

Explain the type of records maintained in the primary schools.

3.2 GUIDELINES FOR GOOD RECORD KEEPING

You have seen that it is an important obligation for every school, no matter the type, to keep appropriate records. The type and format of records are usually specified by the Ministries of Education at the local government, state and federal levels. Most of these records are the same in most of the school. Now let us look at the guidelines for keeping these records.

3.2.1 For the classroom teacher in keeping academic records of pupils,

- i. Records of academic achievement in each subject should be kept separately
- ii. The different raw scores from different assessment instruments such as tests, assignments, projects etc should be recorded and the maximum possible score that a pupil can obtain should also be indicated.
- iii. The scores of all the pupils in the class should be recorded together. It should be done serially.
- iv. Aggregates of all the raw scores should be computed.

- v. Transform the raw scores of the pupils into percentages. Then the percentages should be transformed into standard scores like Z-score and T-score or percentile ranks.

3.2.2 For recording personality (Affective) and psychomotor scores

- i. Record all the rating scores in the same way you record test scores.
- ii. The ratings from different teachers, in such situations where ratings are done by different teachers, you should record one rating for each pupil. This rating should be the mean of all the ratings from the different teachers. The mean is got by the addition of all the ratings from all the teachers and have the sum divided by the number of teachers.
- iii. When you record the scores, do that serially as it is in the academics.
- iv. You do not need to transform the scores from personality and psychomotor assessment to standard scores as you did in the academic scores.
- v. Rating of performance in the case of personality could be done once in a term or once in a year.

3.2.3 For the schools records of academic performance of pupils:

- i. Make a list of all the subjects which the pupils have studied during the period under consideration.
- ii. You should also record the summaries for each school terms and also the summary for the whole year or session.
- iii. You should transform each of the summaries into standard scores like T-score or Z-score and the percentage rank.
- iv. Only one set of scores should be adequate for personality and psychomotor domains of behaviour.
- v. Where different teachers have participated in rating the pupils, the mean value of the different teachers' ratings should be computed and recorded.
- vi. Finally, the numerical values recorded can be transformed into qualitative descriptions using such adjectives as excellent, good, fair, poor and very poor.

4.0 CONCLUSION

As a teacher, a very important aspect of your primary assignment is keeping records. A well kept record is very vital and useful in the running of the school. Records are very important to you as a teacher and a counselor, to the pupils themselves, to the parents, the school, the Ministry of Education, the society and the employers of labour. You should therefore make sure that appropriate records are well kept. In the next unit, we shall look at reporting of tests and scores.

5.0 SUMMARY

In this unit, you studied the types of records kept in the primary school system. These include teachers class/school records – scheme of work, diary, progress report etc;

students cumulative record files and transcripts. You also studied the guidelines for teachers in keeping these records. These include guidelines for teachers in keeping academic records of the pupils, records of personality and psychomotor scores and school records of academic performance.

6.0 TUTOR MARKED ASSIGNMENT

1. Explain the types of records you keep in the primary school.
2. What are the guidelines for keeping academic records of pupils?

7.0 REFERENCES/FURTHER READING

Obimba, F.U. (1989). *Fundamentals of Measurement and Evaluation in Education and Psychology*. Owerri. Totan Publishers Ltd.

Ughamadu, K.A. (1994). *Understanding and Implementing Continuous Assessment*. 2nd Ed. Benin City. World of Books Publishers.

ANSWERS TO SELF ASSESSMENT EXERCISE

The types of records are:-

- i. Teachers class/school records which includes scheme of work, dairy of daily record of work, progress report etc.
- ii. Students cumulative record file and
- iii. Transcript.

UNIT 2.0 GRADING, INTERPRETATION AND REPORTING OF EVALUATION RESULTS

CONTENT

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Norm-referenced versus criterion-referenced tests
 - 3.2 Weighting
 - 3.3 Grading
 - 3.3.1 Percentage system of grading
 - 3.3.2 Letter system of grading
 - 3.4 Interpreting test scores
 - 3.5 Reporting evaluation results
 - 3.6 Handling the school report card
 - 3.7 Functions of the school report cards
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignment
- 7.0 References/Further Reading

1.0 INTRODUCTION

In the last unit, you studied the different types of records which are kept in the primary school system. In order to generate some of these reports, the pupils have to take tests, and examinations. Before you actually start grading and reporting pupils test and examination results you would have decided what type of interpretation you are going to give to the test. If it is a norm-referenced test, a norm-referenced interpretation should be given to it. But if it is a criterion-referenced test, you have to give it a criterion-referenced interpretation. In this unit, you will learn the grading of the tests, interpreting test scores and reporting the results.

2.0 OBJECTIVES

At the end of this unit, you should be able to:-

- i. differentiate between norm-referenced and criterion-reference
- ii. define the weighting of test items
- iii. explain the types of grading.
- iv. discuss how to interpret test scores

- v. describe how to report evaluation results.
- vi. explain the handling of school report cards
- vii. maintain the functions of the school report cards

MAIN CONTENT

3.1 Norm-referenced versus criterion-referenced tests.

In the norm-referenced tests pupils performances in the achievement test are interpreted in terms of how they compare with the norms established for the test, that is the pupils relative positions among the typical group or class of pupils for whom the test is designed. In this type of interpretation, the description is not of what percentage of the test items the pupil answered correctly but just what percentage of the pupils in the group or class that he has surpassed or fell below. For example, Femi solved the Mathematics problems more accurately than 80% of the pupils in his class. Again, Uche's performance in the English test places him in the 3rd position in his class of pupils. If you look at the various entrance examinations, the civil service promotion examinations and all examinations for selections are given this type of interpretation. It is also used for grouping and grading of pupils because the test is designed to rank pupils high to low on basis of achievement. The items in this test are pulled from across a widespread area of learning. It is usually standardized.

In the case of the criterion-referenced tests, pupils performance in the achievement test are interpreted according to how they meet a set standard or criterion. This criterion can be a performance task or the attainment of an instructional objectives. The pupils performances are judged, but not in comparison with the other pupils' performances. The interpretation is based on the percentage of the test items answered correctly. How well other pupils performed is not considered, individual mastery of the subject is the important issue here. Some classroom tests and certificate examinations are given this type of interpretation. For instance, Musa made 6 credits in his NECO examination. John can multiply two digit numbers correctly. Test items are designed to measure proficiency in a specified tasks.

For all measurement purposes, note that neither the norm-referenced nor criterion-referenced tests is superior to the other. The use of one may be more appropriate than the use of the other at different times in particular testing situations.

3.2 Weighting

When you construct a test for your pupils, you assign weights to the various test items. What you have done is to assign scores to the test items, for the purpose of scoring the responses. The weight is the point or score value for the correct response to each item. It is the point to be earned by any pupil who responded correctly to the test item. For instance, a test containing multiple choice items and essay items may be weighted I

marked for each correct multiple choice answer and 15 marks for each correct essay answers. There are two types of weighting-uniform and differential.

In the uniform scoring weights, all the items score equal points or marks ; while in the differential scoring weights some test items are scored more than the others. This may be due to their level of difficulty, relative importance or because they are considered more time-consuming. But as much as possible, try to avoid differential weighting.

3.3 Grading

When your pupils have succeeded in taking the test, the next step that follows is grading and the first step in grading is scoring, the teacher marks or scores the pupils test items responses by awarding scores appropriately according to the predetermined weights. The sum total of all the points or scores or marks obtained by a pupil is called his raw score. After this, grading which means the conversion of these raw scores, showing the performance data, into meaningful ratings of quality. We shall look at two major types of grading. These are the percentage system and letter system.

3.3.1 The Percentage System of Grading

This is a grading system in which a 100-point scale is used for indicating the level of pupils achievement in a test or examination. What a pupil gets is based on the percentage of the items which he has answered correctly. For instance Obi scored 80 marks out of a maximum mark of 100. it means Obi has 80%. But if he makes 60 points out of 80 maximum marks obtainable, it means that Obi's percentage score is $\frac{60}{80} \times \frac{100}{1} \% = 75\%$

Pupils like Tunde, Simbi, Ada can score 50%, 73% and 82% respectively in a subject. Again Ibe may score 70% in English, 60% in Mathematics, 81% in CRC etc.

3.3.2 Letter Grading System

Letter grading can be used to indicate pupils' performance in a test. There are mainly two types of letter grades used. These are five and nine letter grades. Most testing organizations and educational institutions make use of either of the two. The five letter grades make use of A, B, C, D, E; while the nine letter grade use A, AB, BC, C, CD, D, DE, E. some may use A, B⁺, B, C⁺, C, D⁺, D, E, F. The percentage score range of each letter grade and description can be given as follows:

A	=	80% to 100%	=	Very good or Excellent
B	=	60% to 79%	=	Good
C	=	40% to 59%	=	Average
D	=	30% to 39%	=	Poor or Below Average
E	=	0% to 29%	=	Very Poor

In the nine letter grade we may have something like this

A	=	80% - 100%	=	Excellent
AB	=	70% - 79%	=	Very Good
B	=	60% - 69%	=	Good
BC	=	50% - 59%	=	Fairly good or Above average
C	=	40% - 49%	=	Average, Fair or Satisfactory
CD	=	30% - 39%	=	Poor or Below Average
D	=	20% - 29%	=	Poor
DE	=	10% - 19%	=	Very Poor
E	=	0% - 9%	=	Extremely Poor

The West African School Certificate and General Certificate in Education use A₁, A₂, A₃, C₄, C₅, C₆, P₇, P₈, and F₉. Different institutions use their own grade to suite their own purpose.

SELF ASSESSMENT EXERCISE 1

- i. What is the grading system in your university NOUN?
- ii. What is the grading system in your last institution before NOUN?

3.4 Interpreting Test Scores

In your course EDU 426 Measurement and Evaluation, you read in details the various ways of interpreting scores. In this section, we briefly touch it to refresh your memory and for you to know that it is your function as a teacher to interpret the scores of your pupils. The raw score as it is got from marking the test, does not mean much. It does not give a meaningful information, on the relative standing in the class, or how many pupils scored more or less. For instance, a raw score of 70% does not tell you whether it is above or below average performance. It can only be interpreted based on a set of standards, if it is a norm-referenced test or based on a criterion if it is a criterion-referenced test. In the continuous assessment programme, it is very important that test scores are properly interpreted and the pupils' academic progress effectively reported to parents. Let us look at some ways of interpretation.

3.4.1. Age Norms

This can be obtained by assembling the scores of pupils from the same age group or age bracket and getting their average. This result is the age norm. For instance, if we assemble 12 year old pupils in the class, collect their scores in a particular test and sum the scores and then divide the sum by the number of these 12 year old pupils. The result gives us the age norm for this age group. It means therefore that any member of this age group can have his scores interpreted as above or below the age norm.

3.4.2 Grade Norms:

The reference group here is a grade or class. If a class is given a test, the average score of the class is calculated by adding the scores from all the pupils in the class and dividing the sum by the number of pupils in the class. The result is the classroom. Pupils scores can be interpreted using this norm.

3.4.2. Standard or Derived Score Norms

Under this we have the percentile norm and the standard scores such as Z-Score, T-Scores and Stanine. In this section, we shall briefly describe the percentile. This is because the others are discussed in the next module. The percentiles divide a distribution of scores into 100 equal parts. The percentile norm interprets a pupils score in terms of what percentage of the pupils in the class that took the test that he surpassed. For instance, a percentile of 65th or P₆₅ shows that it is a value below which 65 percent of the individuals in the group lie. For each of your pupils raw score, the percent of pupils or cases that fall below that score should be computed.

3.5 Reporting Evaluation Results

The process of informing parents about the progress of their child or children in school is called reporting. It includes test results as well as information collected on the pupils through all other evaluation techniques. All the test and non-test data collected, processed and stored in the child's cumulative record folder are retrieved and reported to parents. It means that the progress report of the child is a combination of academic and non-academic reports. There are three main ways of reporting. These are

3.5.1 Parents-Teacher Conference

Most of the times, especially during P.T.A. meetings, a class teacher meets face-to-face with the parents of his pupils. In this meeting, the teacher reports the children's progress academically or otherwise in the school to the parents. The information given out is usually from that stored in every child's cumulative record folder. Apart from the report, parents and the teacher can also ask questions for clarifications on the child's behaviour. Since the parents in the home and teachers or administrators in the school work in partnership for the all-round development of the child which is the common interest.

3.5.2 Written Report or Personal Letter

This is another way through which the class teacher reports the progress of the child to the parents. It involves a comprehensive report of written information on:

- i. the objectives of the subjects, taught and the criteria for marking the pupils performance in such subjects;
- ii. the academic performance of the pupils; and
- iii. other significant qualities of the child.

Every information about the child is communicated to the parents in writing. It is therefore very difficult to do if there are so many pupils in a class, and can be time consuming.

3.5.3 Report Card

This the most common medium through which pupils progress in the school are reported to parents in Nigeria. It is given periodically and regularly. It contains all the information obtained from the continuous assessment records of the pupils in the school the report cards vary from state to state and from private school to public schools. But the information contained is almost the same. See examples.

SELF ASSESSMENT EXERCISE 2

Collect report cards from different schools private and public. Compare and contrast. Note the differences and similarities.

3.6 Handling the School Report Card

A report card should be able to contain such information as:

- i. the name of the pupils and his class
- ii. the number of days of attendance at school and the number of days absent
- iii. the grades made in the various school subjects for the term or period covered by the report, given as a letter grades or numerical grades or both. For instance A or 81% or 81% A. You can go a step further to define the grade as Excellent or Very Good etc.
- iv. some brief comments by the teacher:
 - pupils specific difficulties, if any
 - pupils specific behaviour, and
 - other significant personal qualities of the pupil

Most states have common report cards for all the primary schools in the state. They use one booklet for each pupil in the school. This will be used throughout his school life. Look at the different information contained and the way they are completed.

3.7 Functions of the School Report Card

You know that there are various people who are concerned with the education and well-being of the child. The report card can be very useful in various ways to these people. They include:

- (a) the pupil himself: the information contained in his report card:
 - i. gives the pupil a feedback on his strength and weaknesses in learning

- ii. motivates him to work hard or for improvement or to maintain his standard if it is already a high one.
- iii. helps him in making his educational and vocational plans

(b) the parents:

- i. reports pupils school progress to the parents
- ii. reports school objectives to the parents
- iii. helps them to know how best to assist their child make sound future educational and vocational plans.
- iv. Helps them to know how best to help their child in his school work in view of the child's strength and weaknesses.
- v. makes parents able to cooperate better with the school in promoting the development of their child, since they have known their child's progress in respect to the school objectives.

(c) the teacher

- i. helps the teacher in diagnosing pupil's learning difficulties
- ii. helps the teacher in planning what to teach and how to teach, having known the teaching success and outcomes of the educational effort in respect of the pupils.
- iii. helps the teacher in understanding pupils personal-social problems.

(d) the school counselors:

- i. in helping the pupils to understand themselves more;
- ii. in educational, vocational, and emotional counseling of the pupils

(e) the school administrations:

They take some administrative decisions and actions based on the progress report of the pupils contained in their report cards.

- i. they determine the promotion of pupils to new classes
- ii. they determine deserving pupils for the award of honors and prizes
- iii. they determine the eligibility of pupils for sporting activities, and
- iv. they report about the pupils to other schools and prospective employers as the need arises.

4.0 CONCLUSION

This unit has provided you with the practical information on the duties you will have to perform as a classroom teacher in reporting the assessment results of the pupils in your class. In the continuous assessment process these little details are practices. It is part of what makes continuous assessment cumulative.

5.0 SUMMARY

In this unit, you have studied the difference between the norm-referenced and criterion-referenced tests. You also read that weighting is the assignment of scores to the test items for the purpose of scoring or marking the responses. When you assign scores otherwise called raw scores, you now use it to grade the pupils. Grading is the conversion of the raw scores into meaningful ratings of quality. The types of grading include, percentage and letter grades. Test scores can be interpreted in the form of age norms, grade norms and standard or derived score norms. The various ways of reporting evaluation reports are through parents-teachers conference, written report or personal letters and using report cards. You also learnt about how to handle the report cards and the functions of the report cards to various people.

6.0 TUTOR MARKED ASSIGNMENT

1. Define the following weighting and grading
2. What are the ways of interpreting test scores
3. Explain the ways of reporting evaluation results
4. Explain the two types of grading

7.0 REFERENCES/FURTHER READING

Obimba, f.U. (1989). *Fundamentals of Measurement and Evaluation in Education and Psychology*. Owerri. Totan Publishers Ltd.

Ughamadu, K.A. (1994). *Understanding and Implementing Continuous Assessment*. 2nd ed. Benin City. World of Books Publishers

ANSWERS TO SELF ASSESSMENT EXERCISE

Exercise 1

Students should find out these grading systems

Exercise 2

Students should look for and collect the report cards for comparison

UNIT 3.0 ADMINISTRATION OF THE CONTINUOUS ASSESSMENT

CONTENT

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 School Continuous Assessment Committee
 - 3.2 Functions of the Committee
 - 3.3 Continuous Assessment at the various levels
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignment
- 7.0 References/Further Reading

1.0 INTRODUCTION

The administration of continuous assessment programme in the school system is not a small project. It is a gigantic endeavour which demands a lot of co-operation, efforts and also carefully and systematically co-ordinated synergy. As a teacher, it is not possible for you to handle it alone. You can only do it through the systematic co-ordination and co-operation which can be achieved through the setting up of school continuous assessment committees these committees should be responsible for seeing to the effective implementation of the various aspects of the continuous assessment in the school. Apart from this school continuous assessment committee, efforts should be made to create such committees at the local government level, state and national levels.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- i. Describe the composition of the school continuous assessment committee
- ii. Mention the functions of the committees.
- iii. Describe continuous assessment at the various levels.

3.0 MAIN CONTENT

3.1 School continuous assessment committee.

As you have learnt in the introduction, the implementation of the continuous assessment in the school system is not a very small project. Therefore, it should be handled in co-operation between the teacher and the school continuous assessment committee. It means that at the various levels where continuous assessment is practiced, there should be a constituted committee. At the primary school continuous assessment level the committee should be made up of:-

- i. the teacher
- ii. the assistant head teacher
- iii. the most senior members of staff with at least one of them coming from the junior primary section of the school.

At the secondary school level, (although this is not within the scope of this course, but let us look at it so as to have an insight on what the committee should look like at different levels) the continuous assessment committee should be made up of:

- i. the school principal or the vice principal (academics)
- ii. the school guidance counselor
- iii. three very senior members of staff who should be the heads of Science, Arts, and Technical departments or their assistants.
- iv. any member of staff who is a specialist in evaluation, test and measurement, psychology or related areas.

3.1.1 Objectives of the school continuous assessment committee

- i. Reporting performances of learners to parents and persons who are interested in the performances.
- ii. Identifying the achievement levels and affective development of various pupils and group of pupils.
- iii. Diagnosing learning difficulties of individual learners and groups of pupils for the purpose of improving instructions.
- iv. Evaluating co-operatively designed standardized instruments which are useful for the evaluation of locally introduced innovations.
- v. Assessing special aptitudes and interests of pupils for the purposes of counseling.

3.2 Functions of the School Continuous Assessment Committee

The functions of the continuous assessment committee in the school are:

- i. Assigning duties on continuous assessment to the various teachers in the school.
- ii. Overseeing the keeping of records and reporting.
- iii. Organizing training and orientation programmes for teachers according to necessary required skills for the operation of the continuous assessment.
- iv. Planning assessment programmes so as to know the frequency of assessment, instruments of assessment and how to report and send the reports to the parents or guardians.
- v. Ensuring the availability and provision of appropriate and adequate assessment materials.

- vi. Facilitating joint and co-operative development and assembling of assessment instruments such as tests, questionnaires, rating scales, etc. including test question banks among schools within the same locality, local government etc.
- vii. Making contacts with similar committees in other schools and also with committees at local or state levels. This will help to reinforce the efforts of the schools and make for some degree of uniformity in the continuous assessment exercises.

3.3 Continuous Assessment at various levels

3.3.1 Zonal / Local Government Level

Every state has zonal education authorities at the zonal boards. At the zonal education board levels and at the local government education authority levels there should be an officer at each zonal or local government level whose responsibility it is to co-ordinate the continuous assessment activities at such level. This officer is to be in-charge of the following activities and functions:

- i. Organization of workshops for the development of continuous assessment instruments
- ii. Execution of test administration in schools within the local government area or zone. The tests to be administered may be the ones developed in the locality or these being administered on behalf of the state Ministry of Education or even the National Centre for Continuous Assessment.
- iii. Taking custody of the developed instruments and or other instruments obtained from some external agencies and sources.
- iv. Placing and acting the role of local adviser to the various school committees in the zonal and local government area.

3.3.2 State Level

At this level, it is expected that an implementation committee should be set up to monitor the implementation of the continuous assessment practices within the State. Apart from the setting up of this committee, the State Ministry of Education should also have in place and functioning Research, Planning and Evaluation units. Using these units and committee the State should be able to monitor the progress of the pupils and help to maintain standard in all the schools in the state. The State should also be able to monitor the performance of pupils at public examinations. The State should also use these set ups to administer standardized tests to all State schools on termly or yearly basis. With these the State can generate normative data using various school levels committees.

3.3.3. National Level

Any continuous assessment committee set up at the National level will have the objectives based primarily on that of monitoring the implementation of the continuous assessment. This committee will obtain national indices of the performances of the

educational system. The National Continuous Assessment Programme and Committee or set up will have such objectives which essentially include:

- i. Formulating competencies expected of pupils of various age or school grade level in various school activities.
- ii. Undertaking National surveys to ascertain the level of attainment of the competencies specified.
- iii. Planning for strategies for arresting and the remediation of any identified unacceptable trends.
- iv. Providing leadership in constructing instruments for continuous assessments with detailed normative data.
- v. Providing aids, resources and technical support for the implementation of the continuous assessment activities.
- vi. Organizing workshops, seminars and conferences to enrich and illuminate the implementation of the continuous assessment.

SELF ASSESSMENT EXERCISE

Go to the nearest local government council or State capital and find out if they have a continuous assessment committee. If they have, find out what they do and how they do it. If they do not have, find out how they monitor the programme in the schools under them.

4.0 CONCLUSION

This unit has given you insight into the administration of the continuous assessment at the various level. You can see that it is really continuous and spiral. This is because the monitoring starts from the top to the school level up to the classroom level. The data collected at the classroom level can be used even at the national level and can be used for the development of the school system. In the next unit, you will be reading about the problems and prospects of the continuous assessment.

5.0 SUMMARY

In this unit, you have studied the school continuous assessment committee and their objectives. You also learnt the functions of the continuous assessment committee at the school level. You also studied the continuous assessment administration at the local level, State and National levels.

6.0 TUTOR MARKED ASSIGNMENT

1. What is the composition of the continuous assessment committee at the primary school level.
2. Explain the various levels of administration of the continuous assessment in the country.

7.0 REFERENCES/FURTHER READING

Obimba, F.U. (1989). *Fundamentals of Measurement and Evaluation in Education and Psychology*. Owerri. Totan Publishers Ltd.

Ughamadu, K.A. (1994). *Understanding and Implementing Continuous Assessment*. 2nd ed. Benin City. World of Books Publishers.

UNIT 4.0 PROSPECTS AND PROBLEMS OF THE CONTINUOUS ASSESSMENT

Content

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Prospect of the Continuous Assessment
 - 3.2 Problems of Continuous Assessment
 - 3.3 Recommendations for Improvement
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignment
- 7.0 References/Further Reading

1.0 INTRODUCTION

In the last unit, you studied the administration of the continuous assessment at different levels. Elsewhere, in this course you noted that continuous assessment practices are not peculiar to Nigeria alone. Some other African countries like Kenya, Liberia and Zambia also practice the continuous assessment. Some scholars have acknowledged that this continuous assessment strategy as it is being practiced in the Nigerian educational system has been regarded as a worthy innovation and acclaimed as a bold step in our educational system. Therefore, if there is any reservation about the strategy, it is with the implementation and monitoring. In this unit, you will be looking at the prospects, the problems and some recommendations.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- i. explain the prospects of the continuous assessment
- ii. describe the problems of continuous assessment
- iii. make recommendations for improvement of the Continuous Assessment process.

3.0 MAIN CONTENT

3.1 Prospects of the Continuous Assessment

We have already stated that there are great prospects for continuous assessment in our educational system, particularly in the primary schools. The extent and level of

implementation of continuous assessment in the Nigerian schools cannot be the same. But the hope is that the schools should make conscious efforts to follow a greater or substantial part of the specifications on the implementation and monitoring of continuous assessment as contained in the Federal Government Handbook on continuous assessment. If this is done, there is every possibility that the continuous assessment will be a success. Talking about success here, we are not just talking about success in implementation but also success in the pupils learning endeavours. You will recall that the continuous assessment was introduced in our educational system at a time when most of the people were nearly fed up with the former end of course external one-shot examination. According to Ezewu and Okoye (1981); Yoloye (1984); Osafehinti (1984) and Osokoya (1987), the continuous assessment system is a more valid assessment method of the pupils overall ability. Validity here arises because continuous assessment samples a much wider range of skills and abilities which are inherent in the course of study. In other words, the continuous assessment strategy probably gives a complete and clearer picture of the learners ability.

In the primary education level, the pupils are exposed to the teaching learning experiences. These pupils are therefore expected to study and achieve the specified objectives. The continuous assessment acts as a reinforcement of pupils learning and better study habits. This results in improved learning and subsequently attainment of the instructional objectives. To this, Osafehinti (1984) expressed the view that it will reduce if not completely eliminate examination leakages. This is because pupils in the school set-up see the need to work continuously and at a steady pace rather than wait for the examination week before getting involved in any serious studies. You know that this situation which was associated with the one-shot examination system, very often leads to permutation of questions for success. It creates anxiety in the pupils. The continuous assessment which involves a continuous and steady pace, studying makes the pupils seek help on those aspects of their work that they have not mastered in the preceding tests. Even the parents, guardians and relations are opportuned or privileged to monitor the progress of the pupils in order to give them the needed remedial attention. It is true that in the past some schools were given weekly or monthly tests which most of the times, the results did not reflect in the final grades of the pupils. The resultant effect of that was that pupils did not take such tests seriously. Pupils performance in a single-examination can be influenced by some factors which are beyond the pupils control at that point in time. Therefore, such an examination will not be enough to give the time picture of the pupils performance. The continuous assessment takes care of all that to a reasonable degree. Since, it is not very likely that most pupils perform at their best in one-shot examinations, continuous assessment strategy then becomes a worthy and acceptable alternative. It should therefore be implemented with all vigours.

Continuous assessment makes use of variety of assessment instruments for the assessment of the pupils. This gives the pupils more opportunities to exhibit their talents. It also cares for individual strengths and weaknesses. If a pupil is not very good for instance, in verbal testing, he may be good in projects, assignment, etc. these assessment tools like project and assignments which are emphasise in the continuous assessment can be used to reveal more about the pupils other characteristics such as leadership qualities

or lack of it, determination, perseverance, creativity, cooperation with others and many more of other acceptable behaviours associated with schooling.

You are already aware that many types of assessment instrument are employed in the implementation of the continuous assessment in the schools. This is because of the fact and also attributed to the fact that continuous assessment lays emphasis on all the levels of objectives in all the domains of behaviours such as cognitive, affective and psychomotor domains. Of course this is why the continuous assessment is said to be comprehensive. The previous system of assessment did not recognize this aspect. This is why Obemeata (1984), described it as measurement of pupils achievement directed mainly towards measures of cognitive behaviour neglecting the assessment of skills which are normally associated with personality characteristics of pupils. According to Oluche (1983), the utilization of a variety of instruments and repeated measurements tend to make the final grade of a pupil in the school will become a crystallisation of his overall course endeavours and performance. Let us look at the teaching-learning situation, you will note that pupils maximum achievement is the interest of everybody including the teacher, who is a key agent in programme implementation and who contributes much to the level of pupils achievement. By now you should be aware of the fact that assessment is an integral and important aspect of the teaching-learning process. You are also aware that the teacher is the key person in the curriculum implementation process. Therefore, any assessment procedure like the continuous assessment should make the teacher much more involved and have the opportunity to participate in the final or overall assessment processes and the greater involvement of the teacher in the overall assessment of the pupils make the teachers to introduce innovations in assessment and teaching. They become more flexible in their classroom interaction. Teachers are now more creative and more self-reliant. They are no more slaves to examination syllabus. They know that their assessment of the pupils which are based on new innovations or new ideas may not be included in the examination syllabus, though, yet they feel it will contribute to the overall or all round development of the pupils and will surely become part of the final assessment.

The school heads and teachers are very much conscious of the fact that production examinations, class assignments, house assignments, periodic tests, projects and all other types of assessments contribute to the overall results of the external examination. To this effect, they put more efforts and direct these efforts to their teaching instead of directing more efforts on examination preparations. Of course any pupil who is already doing very well in the continuous assessment is expected to do well in the overall evaluation.

The teacher self-assessment of his instructional methods or techniques is another prospect of the continuous assessment process. They do this by reviewing the feedback of the continuous assessment exercises, from time to time. This therefore, leads to great improvement of such techniques and methods. The teachers job becomes more complete as he assesses not only his pupils but also himself. Regular assessment of the pupils and prompt feedback from the teacher to the pupils on their efforts allow them to make adjustments where they are necessary. The teachers regular self assessment helps him get

feedback about his teaching and as to what strategies to be adopted to achieve the desired goals and which strategies that are failing to meet the desired goals.

Recall that we said that continuous assessment is guidance-oriented. Continuous assessment is useful for diagnostic purposes the result of which is used for guidance and counseling. The areas of strengths and weaknesses in pupils performance, teachers instructional procedures and the curriculum itself are diagnosed the information obtained acts as a basis for encouraging the pupils improvement on their efforts, remedial work and the improvement in the techniques of instruction.

You also know that continuous assessment is systematic in nature. This is because the purpose and timing of the assessment procedures are specified well in advance. This helps that pupils, the teachers, the parents or guardians in planning for the promotion of the pupils progress. This also provides the basis for more career guidance of the pupils. Data from continuous assessment are used for appropriate guidance of the pupils with regards to choice and preparation for career. This may be in the area of technical, vocational, professional, business or pure academics. A well kept record, which is a part of continuous assessment will enable the parents or guardians to accept the teachers advice on the pupils ability to proceed beyond a particular level of schooling and in what direction. A comprehensive, cumulative and reliable data collected, recorded and stored help to show the type of progress pupils can make as a result of exposure to arrange and incidental experiences within and outside the classroom setting in a particular cultural setting.

Let us reiterate once again that the teacher is the key agent for the effective implementation of the continuous assessment programme. Its success in our school system is greatly dependent on the teacher's ability to produce and use various assessment instruments which met the requirement of the programme. His is why you have to take this course very seriously.

3.2 Problems of Continuous Assessment

In the forgoing section, you learnt the prospect of the continuous assessment in our primary school system. But we want to say that already some problems and fears have been detected and expressed. You know that the continuous assessment programme was adopted and introduced without any trial or pilot testing. This has already created some problems, especially in the area of implementation and monitoring which are very necessary for the success of the programme. On the area of implementation, two major problems have been identified. These are comparability of standards and records keeping and continuity of records.

If you participated in the former single or national examination system, you would have noticed that there was a basis for comparing pupils' performances across the schools in the different parts of the state or country. This is very difficult for the continuous assessment system. This problem is attributable to (i) variations in the quality of tests and

other assessment instruments used in the schools and (ii) variations in the procedures for scoring and grading of the different schools.

It is a common knowledge and we have to accept that standards of assessments by different teachers in various schools across the country, state, zone or local government areas cannot be the same. Can you guarantee that a score of 72% in Social Studies in school X is the same in school Y in the same subject? Teachers assess their pupils. But it is very difficult to ascertain whether the standards of all assessments by the different teachers are the same. Some teachers may set very easy tests, while others set very difficult ones. The tests and other instruments may not have been designed to cover the same topic areas. It is even questionable and also very difficult to think of comparability of standards in a situation where schools and pupils within the system differ considerably in terms of programmes offered, tradition, inputs, teachers qualifications, pupils' abilities, entry behaviours, etc.

Record keeping according to Ughamadu (1994), is one of the most intransigent problems of continuous assessment. Schools have not got the same pattern of record keeping. Records are not properly kept, workload of teachers do not allow them do effective record keeping, especially where the schools are under-staffed. Teachers are not thorough with record keeping. Some don't even know the great need for proper and accurate record keeping. Due to lack of space in most schools, they do away with some records after some times. This is not good at all. Some schools do not have facilities for record keeping. In some cases head-teachers keep school records in their private residence, due to lack of offices. When pupils change schools for one reason or the other, if the records are not available, transfer of records becomes impossible. Where it is possible to transfer the records, comparability of standards become an issue of concern.

Another problem is that of abuse. According to Kosemani (1986), the power of assessment which is the greatest instrument placed at the disposal of the teacher in the school system can be abused. His fear is that in a country like Nigeria where moral decadence is manifested in all spheres of life, the problem of objectivity on the part of the operation of the educational system is called to question with reference to continuous assessment.

Some teachers are in the habit of awarding pass marks to their relations or friends who do not deserve such marks. While some others do not feel it is improper to deprive pupils of their rightful scores or marks for reasons other than their performance. Another problem is that of objectivity in the pupils assessment. The concern is with the accurate and fair assessment. Is justice going to be done equally to all pupils irrespective of tribe, culture, areas of residence- rural or urban etc.

Pupils who are given home assignment may eventually have the assignments done with the assistance of indulgent parents or relations and some times some times the scores are prejudiced by pupil- teacher relationships. It may therefore not reflect the true pupils' achievement. Parents may like to influence the scores of their children by inducing the teachers. This will bring about examination mal-practices at a higher level.

In the past, we have witnessed occasions when school heads allow teachers to assist pupils by way of giving them unfair assistance, so as to ensure higher percentage of passes. Some schools treat and pamper external examiners with goodies. With this in mind what do you think such teachers will do when they are left alone with everything? Certification is based on continuous assessment scores in the primary schools. It is the duty of the head- teacher to issue these certificates. But where the teacher is the sole determinant of the assessment data, then one should be very cautious here.

Emphasis on the continuous assessment is about assessment in the three domains of behaviour. But teachers most of the times do not assess the areas of affective and psychomotor domain. Most of the times too the assessment instruments are not available. Infact, some teacher put down fictitious marks in the pupils records as grades of tests which are not actually conducted. The three domains of behaviour are supposed to be considered before arriving at the overall decisions on each child. The reports from schools have remarks or points for each domain, but most of the times decisions are based on the cognitive components only.

Population explosion in our schools makes it difficult to have effective assessments. Teachers find it difficult to cope with the task of effective teaching of very large number of pupils and adequately conduct the continuous assessment. Some primary schools in the urban schools have up to 90 pupils being handled by one teacher. In such a situation, one test administration takes a long time to mark. This takes more of the teaching time. Again, feedback is not adequately given to the pupils and remediation lessons are not given by the teachers.

Most teachers are not vast or skilled in the art of test construction. According to Ipaye (1984), a major problem of the continuous assessment in the schools is that many teachers are still very much deficient in test construction. Some teachers who use multiple choice because of the ease in marking, and because of large classes, end up constructing very poor items which have ambiguous answers. People have therefore expressed concerns over the non-availability of tests constructed by professional testers for use in our school system.

The comprehensive nature of continuous assessments demands that varieties of instruments be used for the assessments of pupils. But research findings indicate that only tests and assignments are the most popular instruments in use currently by the teachers. Other instruments like projects, interviews, inventory, sociometry, observations, rating-scales, questionnaires, checklists, anecdotal records, etc are rarely used (Alausa,1988; Nkobi, 1988; Osuocha,1988;and Ughamadu,1990).

Unfortunately, with the instruments recommended for use in the continuous assessment practice not properly employed and lack of required training for the teachers pose another problem of continuous assessment implementation in our schools. The Federal Government hand book on continuous assessment shows that scores from the pupils assessment will be transformed into percentile ranks and standard scores like Z and T-

scores. But teachers use only averages and the raw scores. The standard scores are not used. According to Nkobi (1988), and Ughamadu (1990), the teachers do not use them because they lack the necessary computational skills.

SELF ASSESSMENT EXERCISE

Take a trip to some primary schools in your neighbourhood and make a checklist of these problems in their continuous assessment practices.

3.3 Recommendations for Improvement

You know that continuous assessment is in practice in the Nigerian primary school system. Therefore, no matter the size of the problems facing the operation and whatever problems the teachers are experiencing with the system, they cannot back out or stop it. This is because they cannot afford to break a national education policy. Of course, you know that it is enshrined in the National Policy on Education (NPE). So they have to see how best to operate it in their schools. For the improvement of the continuous assessment, we recommend;-

- i. Pre-service training for all prospective teachers; The teacher is the key agent in the implementation of the continuous assessment. It is very important that all prospective teachers pass through intensive and rigorous training involving the concepts, modalities and techniques of continuous assessment. It should be a full time course in the colleges of education, faculties of education and all the institutions that train teachers.
- ii. In-service training for all teachers;- There should be intensive and regular in-service training for every teacher in the school system, head-teachers, ministries of education officials and every other persons concerned with the education of the pupils. This may be done through workshops and seminars. The training and retraining should focus on the following skills:-
 - a. effective planning of teaching strategies compatible with subject areas.
 - b. Planning, construction and utilization of achievement tests and other assessment instruments necessary for measuring pupils learning.
 - c. Effective planning, designing and utilization of instruments for the assessment of personality characteristics and psychomotor behaviour.
 - d. Scoring and interpreting scores from assessment instrument.
 - e. Remediation of identified problem areas of the pupils.
 - f. Skills in the relevant statistical computations and operations. This will include tabular and graphic presentations of data, computations of the measures of central tendency and transformation of raw scores to standard scores and percentile ranks.
 - g. Maintenance of detailed records and preparation of pupils' reports and reporting.

- iii. The in- service training of the teachers should be handled by experts in the areas. The Federal Ministry of Education, various states and local government should ensure the effective trainings.
- iv. Pupil- teacher ratio should be reduced: the pupil-teacher ratio should be drastically reduced to help teachers cope with the rigours of the implementations of the continuous assessment.
- v. Effective use of assessment data or test scores: these should be used for the identification of the pupils difficulties and helping them to learn and master areas of deficiency before going to the next unit of work.
- vi. Make use of all relevant information: all information about the pupils learning and personality characteristics should be used so as to get a clear and total picture of the pupils and build their guidance and counseling on this total picture.
- vii. Effective coordination: this should be used for the proper attainment of comparable standards. The committees should be made use of towards this area.
- viii. Uniform procedures: teachers operating in the same system should keep to uniform procedures, especially in the areas of planning, construction of tests and other assessment instruments. This is to help them cover the same areas and essentially assess the same thing.
- ix. Provide test resource centres: test resource centres should be provided to have the responsibility of creating question banks for the use of the schools. A group of teachers at every coordination level should be assembled and charged with the responsibility of developing assessment instruments with the supervision of experts in testing, measurement and evaluation.
- x. Development of tests: from time to time, teachers should be called upon to set questions which should be sent to the zonal or chief inspectors of education at the local or state levels. Those questions are assembled, moderated and pilot tested. They are to be stored in question banks for the use of the schools at different assessment periods.
- xi. Uniform system of weighting: a final grade of the pupils coming from class tests, home assignments, projects and final examinations should have their weights decided in advance. These should be used consistently in all the schools.
- xii. Standard scores: scores from variety of assessment tools used in assessing the pupils should be converted to standard scores like Z-scores and T-scores.
- xiii. Ensure comparability: comparability of standards can be ensured through various ways. These include:-
 - a. using table of specifications when developing tests and providing marking schemes during the marking of scripts.
 - b. Transforming scores to standard scores and percentile ranks.

- c. Making use of standardized tests in the school system.
- xiv. uniform system of recording: reliable and necessary information comes from good records. For reporting to parents and other bodies, for easy transfer, combination of records, a uniform system of recording should be maintained.
- xv. Uniform system of grading; weighting of scores and keeping pupils records should be adopted in a uniform system.
- xvi. Adequate storage space and durable facilities should be provided for all schools.
- xvii. Create a continuous assessment unit in all the schools: this unit should be an annex to the head-teachers' office and should be headed by a senior non- teaching staff that is vast in office work and statistics. He should also be computer literate. The unit should be supervised by the head-teacher. He should work in cooperation with the continuous assessment committee. The unit should be in charge of;-
 - a. systematic keeping of all information relating to individual pupils in the school.
 - b. Collection of all assessment scores from the teachers and subsequent entry into the pupils' report sheets.
 - c. Coordination of all assessment decisions arrived at by the school continuous assessment committee.
 - d. Ensuring that committee's decisions are promptly communicated to all the teachers.
 - e. The unit head should function as the secretary of the committee.
- xviii. pupils should always be exposed to practical work through whole class activities, group works, individual activities, project works ,etc. These should be assessed to have comprehensive data as required in the continuous assessment.
- xix. Evaluation of antecedents and transactions should be conducted. Manpower in the area of teaching and supportive staff with respect to quality, qualifications, predisposition, pupils intellectual ability, socio-economic status, the school setting, administration, etc should be evaluated fro time to time. On the side of transaction, such elements as instructional materials and the instructional strategies applied in the teaching- learning process should be constantly assessed for improvement.
- xx. Provision of computers: this is an information and technological age. Therefore, every school should be provided with computers to help in record keeping and storage.

Note that these recommendations are not exhaustive. There are many more. The most important is the implementation.

4.0 CONCLUSION

You have learnt that the continuous assessment as it is being practiced in our school system is fraught with a lot of problems. You have also learnt that there are a lot of prospects. You have seen the problems. You have also seen the recommendations. These problems can be easily and adequately taken care of if most of these recommendations are implemented.

5.0 SUMMARY

In this unit you learnt that the continuous assessment has prospects if it is well implemented in our school system. You also studied most of the problems encountered in the implementation of the continuous assessment in the schools. We have made a number of recommendations to improve the implementation and therefore improve the academic performance of the pupils. It is hoped that if these recommendations are implemented, there will be a lot of improvements.

6.0 TUTOR MARKED ASSIGNMENT

Take a trip to some primary schools near your residence. Prepare a checklist of the problems, the prospects and make recommendations where necessary. Find out what is happening, what is existing and compare the result with what you have learnt in this unit.

7.0 REFERENCES/ FURTHER READING

Obimba, F.U. (1989), *Fundamentals of Measurement and Evaluation in Education in Education and Psychology*. Owerri. Totan Publishers Ltd.

Osuji, U.S.A. and Okonkwo, C.A. (2003), *The Importance of Continuous Assessment as An Integral Part of Evaluation in Open and Distance Learning*. African Journal of Educational Research. Vol.9 No. 1& 2. Pages 80- 88. June/ December.

ANSWERS TO SELF ASSESSMENT EXERCICES.

The students should do the assignment on individual basis.

MODULE 4: ANALYSING DATA FROM CONTINUOUS ASSESSMENT

- UNIT 1.0: Organization of data
- UNIT 2.0: Ranking of Scores
- UNIT 3.0: Measures of Central Tendency
- UNIT 4.0: Measures of Variability
- UNIT 5.0: Standard Scores

UNIT 1.0 ORGANIZATION OF DATA

Content

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
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 - 3.1.1 Tabular presentation
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 - 3.2.1 Frequency distribution of grouped data
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1.0 Introduction

As a teacher, when you teach your pupils, you have to assess them. When you assess them, you have to measure their level of achievement. Therefore, you generate scores. You may be interested in presenting the scores so as to be meaningful and give people a clear idea of the general pattern in the set of scores and so the general pattern of performance. You may also be interested in the highest and lowest scores, the mean performance of the pupils, comparison of the performances of the pupils with those of others and also comparison of a pupil's performance in different subjects etc. It means that you will be involved in some statistical operations. In this unit, you will be exposed to the organization of data which will subsequently lead you to some of these statistical operations you need in the continuous assessment system. Every other statistical tests are treated in your course on Basic Research.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- i. Explain what is data presentation
- ii. Prepare a frequency table given some scores
- iii. Draw a histogram with a set of scores
- iv. Constructs a frequency polygon with a given set of scores.

3.0 MAIN CONTENT

3.1 Data Presentation

When you teach and assess your class, you have a group of scores which are called raw scores. At this stage, they are unorganized and cannot be interpreted with ease. If you want to get the highest or the lowest scores, you will see that it will not be easy at a glance, especially when the scores are many. But you can make the scores more meaningful if you arrange them in order. You can arrange them from the highest to the lowest or the other way round, for easy interpretation, if you have been teaching, you notice that this is what teachers usually do. For instance, the scores of 15 pupils in English are given as follows: 24, 34, 39, 15, 19, 18, 30, 29, 27, 12, 37, 10, 21, 28, 17. These scores can be arranged in ascending or descending order: 10, 12, 15, 17, 18, 19, 21, 24, 27, 28, 29, 30, 34, 37, 39. With this, you can see at a glance the highest and the lowest scores.

3.1.1 Tabular Presentation

A table is an orderly arrangement of data in columns and rows. It is designed in such a way that information can be conveyed crisply. Continuous assessment data are presented in tabular forms. A considerable variety of tables is possible in the way statistical tables are designed. But this depends on the classification of the data. For instance, the set of scores above can be put in a table:

S/N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Score	24	34	39	15	19	18	30	29	27	12	37	10	21	28	17

Table 1: Scores of 15 pupils in a test on a table

Note that a table can have two columns, or many columns. It could be two dimensional or multi-dimensional. Whatever the nature of the table, there are certain general rules you have to apply when you are drawing tables. Some of these are:

- i. Every table should have a short, self-explanatory, descriptive title
- ii. When necessary, additional explanatory notes should be added

- iii. The columns and rows should be arranged in logical sequence
- iv. The table should be neat and simple to make for effectiveness

3.2 Frequency Distribution—Ungrouped Data

This is a set of ordered scores and their corresponding frequencies. When scores are presented in this way, which is also in tabular form they become much more meaningful. Let us define frequency of a score as the number of times the score occurs. For instance, if a score of 50 appears five times in a distribution, we say the frequency of 50 is 5. Distribution can be taken to mean a set of ordered scores, or scores arranged from lowest to highest. For example, look at the following scores:

25, 30, 50, 60, 75, 30, 60, 65, 70, 25, 30, 40, 45, 50, 30, 45, 72, 80, 85, 75, 50, 65, 72, 40, 55, 72, 60, 82, 90, 85, 82, 70, 75, 60, 55, 50, 45, 35, 70, 50, 37, 42.

These scores can be arranged in frequency table as shown

Score	Tally	Frequency
90	I	1
85	II	2
82	II	2
80	I	1
75	III	3
72	IIII	4
70	II	2
65	II	2
60	IIII	4
55	II	2
50	IIII	5
45	III	3
42	I	1
40	II	2
37	I	1
35	I	1
30	IIII	4
25	II	2
		42

Table 2: Frequency distribution

3.2.1 Frequency Distribution of Grouped Data

When you have many scores, for instance, in a class tests where all the pupils have scores, it is very economical and easier to resort to grouping the scores into broader categories by class intervals. When you do this, the data will be in amore compact form for more meaningful interpretation. A composite table for a frequency distribution of grouped data contains (i) the class interval which is a group of scores forming a single category such that there are two extreme scores – lowest and the highest, within the category (ii) class limit: referring to each of the two extreme scores in a class interval. The lowest is called the lowest class limit, while the highest is the upper class limit. (iii) class boundary which is the mid point between two consecutive class intervals. Now let us represent the scores above in a group data table. See Table 3

Of scores of 42 pupils

S/N	Class Interval	Class Limits
1	86-90	85.5-90.5
2	81-85	80.5-85.5
3	76-80	75.5-80.5
4	71-75	70.5-75.5
5	66-70	65.5-70.5
6	61-65	60.5-65.5
7	56-60	55.5-60.5
8	51-55	50.5-55.5
9	46-50	45.5-50.5
10	41-45	40.5-45.5
11	36-40	35.5-40.5
12	31-35	30.5-35.5
13	26-30	25.5-30.5
14	21-25	20.5-25.5

Table 3: Grouped Data

When you want to determine the class size for the class intervals, first you need to find out the range of the set of scores. That is the highest minus the lowest score. Then divide this range by the approximate number of class intervals you want to have. For instance, in the example we have above, the rang is 90-25 that is 65. If we have decided to have 14 groups, we will divide 65 by 14 and approximate to the nearest odd number which is 5. It is better to have odd number so that when you want to have the mid point; it will be a whole number.

3.2.2 Cumulative Frequency:-

This is obtained by adding the frequencies of a frequency distribution in turns and consecutively from the lowest class interval to the highest. Let us use another example in table 4. The cumulative frequency distribution can be used by teacher to present class results. It gives a very clear picture of the pupils performances. For example, if you

want out the number of pupils who have scored below a particular class interval, all you need to do is to read off the cumulative frequency immediately below the cumulative frequency corresponding to the particular class interval. From the table 4, you can see that 35 pupils scored below 70-74.

S/N	Class Interval	Frequency	Cumulative Freq
1	90-94	1	49
2	85-89	1	48
3	80-84	4	47
4	75-79	5	43
5	70-74	3	38
6	65-69	6	35
7	60-64	10	29
8	55-59	8	19
9	50-54	4	11
10	45-49	5	7
11	40-44	2	2

Table 4: Frequency distribution for grouped data showing Cumulative frequency

3.3 Histogram:

This is generally a graphical representation of data. Data are represented in the form of rectangular columns or bars. The bars on adjacent sides touch each other. It is drawn by presenting the class boundaries along the horizontal axis and the frequency corresponding to the class intervals on the vertical axis. When these are plotted, we construct rectangular bars for each of the class boundaries to correspond with the frequencies of the class intervals. Let us use the data in table 4 to draw a histogram. To do this, prepare a composite table to include the class boundaries or the real limits of the class intervals. If you look at the histogram, you will note that along the horizontal axis, between 0 and the first class boundary, there are two strokes //. This shows that the class boundary does not start from zero.

S/N	Class Interval	Class Boundaries	f
1	90-94	89.5 - 94.5	1
2	85-89	84.5 - 89.5	1
3	80-84	79.5 - 84.5	4
4	75-79	74.5 - 79.5	5
5	70-74	69.5 - 74.5	3
6	65-69	64.5 - 69.5	6
7	60-64	59.5 - 64.5	10
8	55-59	54.5 - 59.5	8
9	50-54	49.5 - 54.5	4
10	45-49	44.5 - 49.5	5
11	40-44	39.5 - 44.5	2

Table 5: Composite table

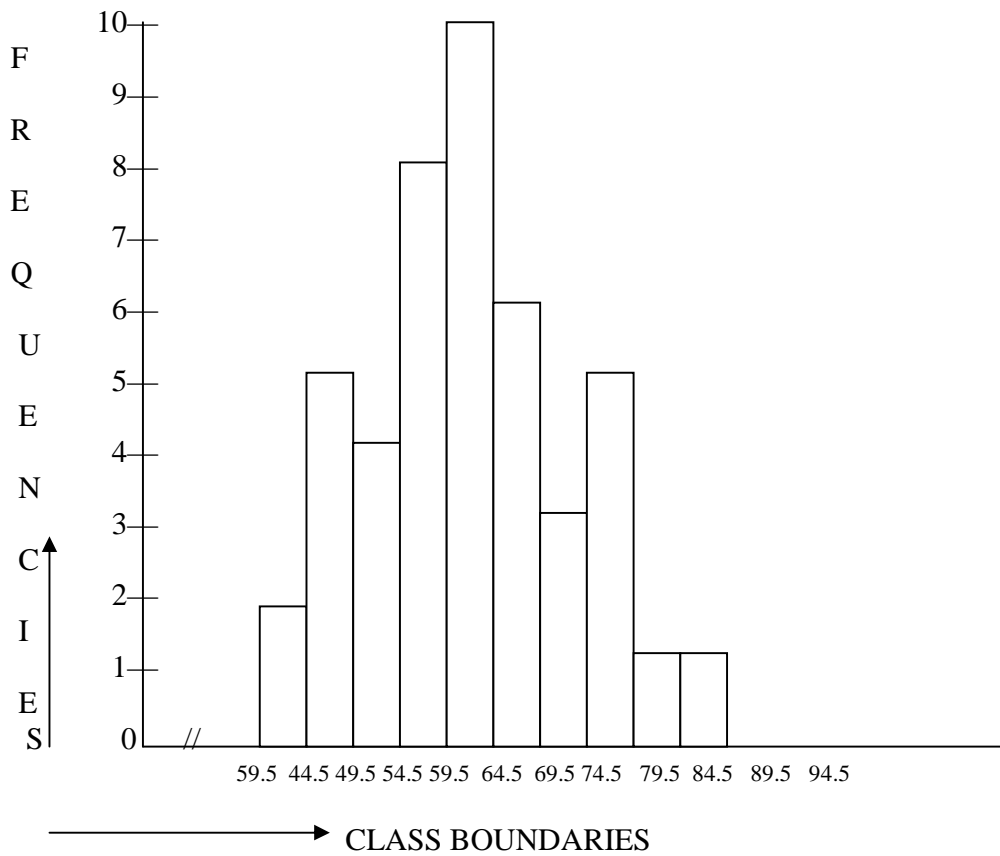


Figure 6: Histogram

3.4 Frequency Polygon

In this case, the mid-points corresponding to each class interval are used along the horizontal axis while the corresponding frequencies are placed along the vertical axis. This is followed by plotting the corresponding points and joining them with straight lines, which rest on the horizontal axis. Let us do this with the data on table 5.

For this, we need to prepare a composite table containing the class intervals, mid points and frequencies.

S/N	Class Interval	Mid Point	f
1	90 – 94	92	1
2	85 – 89	87	1
3	80 – 84	82	4
4	75 – 79	77	5
5	70 – 74	72	3
6	65 – 69	67	6
7	60 – 64	62	10
8	55 – 59	57	8
9	50 – 54	52	4
10	45 – 49	47	5
11	40 - 44	42	2

Table 7: Composite Table

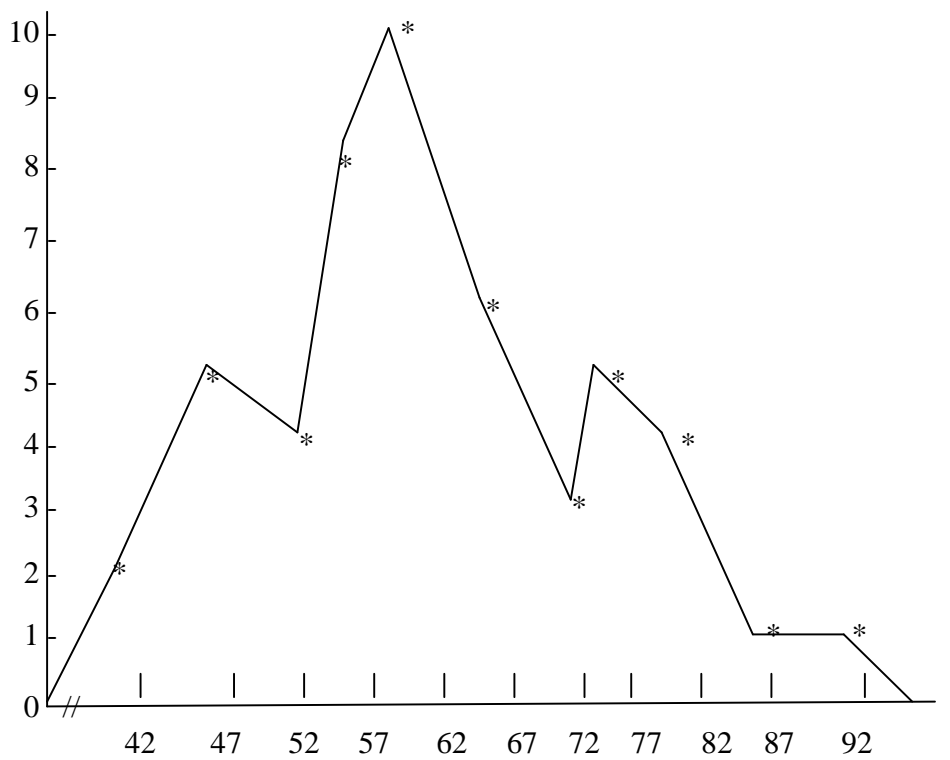


Figure 8: Frequency Polygon

There are other methods of presenting data. You will recall that we are talking about continuous assessment. Therefore, we have decided to present only those that are very important in the classroom situation. You can read the rest from your Course in Basic Research.

SELF ASSESSMENT EXERCISE

Given that 40 pupils in your class took a test and the scores obtained are as follows:

64, 27, 24, 37, 43, 19, 15, 28, 42, 28,

17, 18, 50, 73, 21, 23, 38, 31, 33, 32

20, 31, 53, 32, 32, 20, 24, 23, 29, 36

29, 48, 40, 62, 68, 26, 57, 20, 39, 46

Prepare a frequency distribution table showing, class interval, tally, class boundaries, mid point, frequency and cumulative frequencies.

4.0 CONCLUSION

You have seen some of the methods for data presentation in your classroom teaching and learning process. These methods and those other ones you will get from your course in basic research will help you to present your pupils scores in different ways which will be meaningful and for easy interpretations. In the next unit, you will see how to rank the pupils as another step towards data treatment in the continuous assessment programme.

5.0 SUMMARY

In this unit, you learnt that data presentation implies the organization and arrangement of the data obtained from your class tests in a way that they will be meaningful and for easier interpretation. Data can be presented in a variety of forms such as tabular, frequency distribution, graphical etc. you learnt about some of these methods including frequency distribution of grouped data, cumulative frequencies, histogram and frequency polygon.

6.0 TUTOR MARKED ASSIGNMENT

Present the scores below in a composite table showing the class intervals, class boundaries, mid points, frequencies and cumulative frequencies.

30, 32, 32, 32, 39, 41, 41, 41, 42, 43

45, 46, 46, 46, 47, 47, 48, 49, 50, 50

50, 50, 51, 51, 52, 54, 55, 55, 58, 59

60, 60, 60, 60, 61, 61, 61, 63, 64, 64

65, 66, 67, 67, 68, 68, 72, 73, 74, 75

75, 76, 76, 79, 80, 80, 81, 84, 88, 90

7.0 REFERENCES/FURTHER READING

Obimba, F.U. (1989). *Fundamentals of Measurement and Evaluation in Education and Psychology*. Owerri. Totan Publishers Ltd.

Ughamadu. K.A. (1994). *Understanding and Implementing Continuous Assessment*. 2nd ed. Benin City. World of Books Publishers.

UNIT 2.0 RANKING OF SCORES

CONTENT

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Ranking
 - 3.2 Percentile Ranking
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignment
- 7.0 References/Further Reading

7.0 INTRODUCTION

- (ii) In the last unit, you studied how to organise data generated from your class for meaningful interpretations. It is not sufficient to arrange the scores from test administered to pupils, especially in the continuous assessment programme. You need to go another step further to assign results to each of the pupils' scores. In this unit we shall be looking at how you can rank the scores of your pupils in the class.

8.0 OBJECTIVES

At the end of this unit, you should be able to:

- i. Rank pupils scores in a set of distribution
- ii. Explain percentile ranking

9.0 MAIN CONTENT

9.1 Ranking

At the end of every test, or examination, the pupils want to know their position in the test or examination. They want to find out their rank in relation to other pupils. Parents and guidance are interested first to know the position of their child or ward before they go into the details of the result. It is important therefore that you know how to do the ranking of the pupils in your class at the end of a test, examination or at the end of the term or session.

The rank assigned to scores indicate how such scores stand in relation to others. In other words, the ranks indicate the relative position of each score in the group. We can then define ranking in a simple terms as the positioning of pupils in a class in terms of the scores they obtained in a test or examination. There are two basic methods of ranking. These are the simple ranking and the percentile rank. In this section, we are talking about the simple ranking. In this method, the highest score is assigned a rank of 1 or first, the next is 2 or second, the next 3 or third, etc until all the scores are ranked. This last rank must correspond to the total number of scores under consideration. For you to rank scores, you are first required to arrange the scores in order of decreasing magnitude. In other words arrange the scores from the highest to the lowest. The next step is to start from the highest score to assign the ranks from I and to increase the ranks as the scores decrease in value. For example, 80, 40, 25, 60, 55, 72, 36, 50, 68, 28, 75, 62. You can arrange the scores in order from the highest like

Scores	80	75	72	68	62	60	55	50	40	36	28	25
Rank	1	2	3	4	5	6	7	8	9	10	11	12

Table 1. Ranking of Scores

When you have scores listed without ties it is easy to rank. But most of the times it is not like this. Pupils' scores are bound to tie. Therefore, when too or more scores are tied for the same rank, you have to find the average of ranks of the scores that are tied and assign this average to the tied scores, then the ones following will have their usual ranks. Let us look at this example.

Scores	25	22	20	20	19	18	16	14	14	14	12	11	10	9
Rank	1	2	3	4	5	6	7	8	9	10	11	12	14	15

Table 2: Scores and Ranks with ties.

From this table you can see that 20 appeared twice. Therefore, their ranks at $3 + 4 \div 2 = 3.5$. two of them have the same rank. It means there is no 4th position. You can also see that 14 appeared three times. Their ranks should be $8 + 9 + 10 \div 3 = 9$. All the three scores are ranked 9th, but there is no 8 and 10. In the school system especially the primary schools, what they do is avoid decimal points by assigning the next rank to the scores

that tie and skipping the next, to continue normally. Now let us use the same scores in table 2 as an example.

Scores	25	22	20	20	19	18	16	14	14	14	12	11	10	9
Rank	1	2	3	4	5	6	7	8	9	10	11	12	14	15

Table 3: Scores and Ranks with ties.

SELF ASSESSMENT EXERCISE 1

Rank the following scores: 2, 10, 15, 16, 20, 8, 10, 22, 15, 12, 14

9.2 Percentile Ranking:

The percentile rank of a score shows the approximate percentage of the pupils in the class who scored lower than the particular score. It shows that the higher the percentile rank, the better the performance. This type of ranking is better than the familiar ranking of pupils with raw scores. It is true that ordinary ranking gives useful information about pupils performance compared to others in the same class, but it has its own limitations. For instance

Subject	Raw Score	Simple Rank	No. of Pupils in Class
Mathematics	60	8 th	40
English	65	10 th	42
Science	50	8 th	37
CRK	65	12 th	40

Table 4: Scores of a Pupil and Ranks in Different Subjects

From this table, you would have observed that this particular pupil got the same rank of 8th in Mathematics and Science. But you can also notice that the raw scores are not the same. On the face value, it looks as if this pupil has the same ability in both subjects. This is because the number of pupils who sat for the two subjects are different. Again, look at the scores from English and CRK. You will also see that the scores are the same, but the ranks and number of pupils are different. These bring out the mal-appropriateness of the use of simple ranks. The simple rank is not of much help.

The use of percentile ranks solves the problem and makes interpretation easier. This is because if a percentile rank is higher in any situation,

performance is better. One added advantage of the percentile rank is that a given percentile rank has the same meaning in respect of relative performance in a given class. You have seen that the ordinary rank position with raw scores does not have the same meaning for comparison of performance. So it is better to use the percentile ranks to compare pupils level of performance or achievement when tested by a teacher or by different teachers or even with different assessment instruments. In other words, performance of a pupil in different tests can be compared with percentile ranks; across subjects areas for a particular pupil or even across groups for a given subject.

9.2.1 Computation of Percentile Rank:

You can use various methods for calculating percentile ranks of pupils raw scores. Let us look at some of the methods here.

- (a) Ungrouped data: This method is used especially when the scores are not too many. This involves simply totaling all the frequencies below the particular score plus half the frequency at the score and dividing by the number of scores or cases. The value obtained is then multiplied by 100. the percentile rank of a score is given by

$$PR_x = \frac{\text{Number of scores below the score} + \frac{1}{2} \text{ of these at the score}}{\text{Total Number of scores}} \times \frac{100}{1}$$

Example 1: Given that the scores of 20 pupils in a class are as follows:

Scores	30	28	25	24	20	18	16	15
Freq	1	2	4	5	4	2	1	1
Cum.F	20	19	17	13	8	4	2	1

$$PR_{28} = \frac{17+1}{20} \times \frac{100}{1} = \frac{18}{20} \times \frac{100}{1} = \underline{90}$$

$$PR_{24} = \frac{8+2.5}{20} \times \frac{100}{1} = \frac{10.5}{20} \times \frac{100}{1} = \underline{52.5}$$

$$Pr_{18} = \frac{2+1}{20} \times \frac{100}{1} = \frac{3}{20} \times \frac{100}{1} = \underline{.5}$$

- (b) For Grouped Data:

When you have a large number of pupils' scores to handle and you decide to group the scores; this method is very useful.

It is given by $PR_x = \% CFL + (\%CFH - \%CFL)(X - XL) / C$

Where $\%CFL$ = Percentage cumulative frequency below the class interval

C = Percentage cumulative frequency of the class interval

XL = Upper class of the class interval immediately below the class interval of which the score is to be determined.

Example 2: Using the following scores find the PR

Class Interval	F	CF	%CF
75-79	1	43	
70-74	2	42	
65-69	4	40	$\frac{40}{43} \times \frac{100}{1}$
60-64	5	36	
55-59	6	31	
50-54	10	25	$\frac{25}{43} \times \frac{100}{1}$
45-49	8	15	$\frac{15}{43} \times \frac{100}{1}$
40-44	4	7	
35-39	2	3	
30-34	1	1	$\frac{1}{43} \times \frac{100}{1} = 2.3\%$

$$PR_{47} = \% CFL + \frac{(\%CFH - \%CFL)(X - XL)}{C}$$

$$\% CFL = \frac{7}{43} \times \frac{100}{1} = 16.28$$

$$\% CFH = \frac{15}{43} \times \frac{100}{1} = 34.88$$

$$X = 47$$

$$XL = 44$$

$$C = 5$$

$$\begin{aligned} PR_{47} &= 16.28 + \frac{(34.88 - 16.28)(47 - 44)}{5} \\ &= 16.28 + \frac{16.6 \times 3}{5} = \frac{16.28 + 49.8}{5} + 16.28 \\ &= 11.16 + 16.28 = 27.44 \end{aligned}$$

$$2. \quad \text{For PR62: \%CFL} = \frac{31}{43} \times \frac{100}{1} = 72.1$$

$$\% \text{ CFH} = \frac{36}{43} \times \frac{100}{1} = 83.7$$

$$X = 62$$

$$XL = 59$$

$$i = 5$$

$$\text{PR62} = 72.1 + \frac{(83.7 - 72.1)(62 - 59)}{5}$$

$$= 72.1 + \frac{11.6 \times 3}{5} = \frac{34.8}{5}$$

$$= 72.1 + 6.96 = \underline{79.06}$$

There is yet another method which can be used for determining the percentile ranks. This method is graphical method. It is also used for large number of scores. It requires the plotting of a graph or percentage cumulative frequency (%CF) against the corresponding top score or upper class limit of each class interval. The curve got in this graph is called ogive. Once an ogive is plotted, you can read with ease the percentile rank of any score by tracing a line from the score until it cuts the graph and from the point, trace a line to the left until it intersects with the percentile rank line.

4.0 CONCLUSION

Ranking of scores generated from the continuous assessment processes is always done by teachers in order to give some interpretations to the pupils performance. The simple ranking which is very popular is good. But the percentile ranking is the best. This is because it allows the interpretation and comparison of scores from different sources. It is highly recommended for use in the continuous assessment programme.

5.0 SUMMARY

In this unit you studied the two methods of ranking which can be used in the continuous assessment programme. Ranking is defined as the positioning of pupils in a class in terms of the scores they obtained in a test or examination. You have seen the method used in simple ranking when the scores do not tie or when you have ties.

The percentile rank of a score shows the approximate percentage of the pupils in the class who scored lower than the particular score. In this case and unlike the simple ranking, the higher the percentile rank, the better the performance. You learnt how to determine the percentile ranks with single scores or ungrouped scores and with grouped scores. The percentile rank is preferred when you have large class or scores from different teachers, subjects and sources.

6.0 TUTOR MARKED ASSIGNMENT

Find the percentile rank of 40, 32, and 52 in the scores given

Class Interval	60-64	55-59	50-54	45-49	40-44	35-39	30-34	25-29
Frequency	2	5	6	8	7	4	3	2

7.0 REFERENCES/FURTHER READING

Obimba, F.U. (1989). Fundamentals of Measurement and Evaluation in Evaluation and Psychology. Owerri. Totan Publishers Ltd.

Ughamadu, K.A. (1994). Understanding and Implementing Continuous Assessment. 2nd Edition. Benin City. World of Books Publishers.

ANSWERS TO SELF ASSESSMENT EXERCISE

Arrange the scores in order

Scores	2	8	10	10	12	14	15	15	16	20	22
Rank	1	2	3.5	3.5	5	6	7.5	7.5	9	10	11

ANSWER TO TUTOR MARKED ASSIGNMENT

Class Interval	F	CF
60-64	2	37
55-59	5	35
50-54	6	30
45-49	8	24
40-44	7	16
35-39	4	9
30-34	3	5
25-29	2	2

$$PR_{40} = CFL + \frac{\%CFH - \%CFL}{1}(X - XL)$$

$$\%CFL = \frac{9}{37} \times \frac{100}{1} = 24.32$$

$$\%CFH = \frac{16}{37} \times \frac{100}{1} = 43.24$$

$$X = 40, X_L = 39$$

$$PR_{40} = 24.32 + \frac{(43.24 - 24.32)(40 - 39)}{5} = 24.32 + \frac{18.92 \times 1}{5}$$

$$= 24.32 + 3.78 = \underline{28.1}$$

$$PR_{32} = \%CFL = \frac{2}{37} \times \frac{100}{1} = 5.41$$

$$\%CFH = \frac{5}{37} \times \frac{100}{1} = 13.51$$

$$X = 32$$

$$X_L = 29$$

$$\begin{aligned} \text{.. PR}_{32} &= 5.41 + \frac{(13.51 - 5.41)(32 - 29)}{5} \\ &= 5.41 + \frac{8.1 \times 3}{5} = 5.41 + 4.86 = 10.25 \end{aligned}$$

$$\begin{aligned} \text{PR}_{52} \% \text{CFL} &= \frac{24}{37} \times \frac{100}{1} = 64.86 \\ \% \text{CFH} &= \frac{30}{37} \times \frac{100}{1} = 81.08 \end{aligned}$$

$$X = 52$$

$$XL = 49$$

$$\begin{aligned} \text{..PR}_{52} &= 64.86 + \frac{(81.08 - 64.86)(52 - 49)}{1} \\ &= 64.86 + \frac{16.22 \times 3}{5} \\ &= 64.86 + 9.73 = \underline{74.92} \end{aligned}$$

UNIT 3 – MEASURES OF CENTRAL TENDENCY

CONTENT

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 The Mean
 - 3.1.1 Ungrouped data
 - 3.1.2 Group data
 - 3.2 The Median
 - 3.3 The Mode
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignment
- 7.0 References/Further Reading

1.0 INTRODUCTION

It is very important that scores generated from classroom tests are given appropriate and meaningful interpretations. In the last unit, you studied the ranking of pupils scores in order to interpret them in relation to others. In this unit, you are going to study the measures of central tendency or location which are measures of averages. Each of the measures is an average of a group of data. It gives an indication of the central value of a group of data. The average is said to be typical or representative of the group. The three measures are the Mean, the Median and the Mode.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- i. Describe the mean, the median and mode
- ii. Compute the mean from a group of scores
- iii. Locate the median in a distribution of scores
- iv. Identify the mode in a distribution of scores.

3.0 MAIN CONTENT

3.1 The Mean:

As a teacher, you must be familiar with the mean, which is the same thing as the familiar arithmetic average. It is used for finding the average performance of the pupils in the class or in different school subjects. It is usually represented with the symbol M or \bar{X} . To find the mean of a set of scores, you simply add all the scores and divide the sum by

the total number of scores or cases. You can find the mean for grouped data and for ungrouped data. We shall see how to do this in this section. You know that in the continuous assessment system, the teacher administers at least two tests in a subject in a term. You are expected to compute the mean scores of the pupils in each of the tests. With the values obtained, you can assess the progress or otherwise of the pupils in the class over a period of time. You will compare the values to know if the pupils are doing well or not. Now let us go into the computation

3.1.1 Ungrouped Data

When you have ungrouped data, the mean is given by $\bar{X} = \frac{\sum X}{N}$

where \bar{X} = mean, \sum = Sum of, N = Number of scores and X = the raw score.

Example I. Find the mean of the following scores:

45, 38, 60, 52, 78, 36, 65, 40, 62, 48, 36, 28. The mean will be got by adding all the scores and dividing by 12 i.e. $(45+38+60+52+78+36+65+40+62+48+36+28) \div 12$

$$\bar{X} = \frac{588}{12} = 49$$

Assuming you have given two tests to your pupils and they have come out with scores which you have added to get the mean performances as follows:

Test 1 Mean = 45.5%. Test 2 = 50.4%. When you compare the two means, definitely you will conclude that the class has improved because they did better in the test 2 than in test 1. In this way, you can also compare performance from pupils in different arms of a class.

3.1.2 Grouped Data

Most of the times, you may have to deal with a large class. In this case, the number of scores will also be larger. It means that you have to group the scores. You will recall that we have done grouping of score using class intervals. You should refresh your memory on that. For grouped data, the formula is given by $\bar{X} = \frac{\sum fx}{\sum f}$ where f = frequency.

Example 2: Find the mean of the scores in the distribution.

S/N	Class interval	f	Midpt	fx
1	80 – 84	2	82	164
2	75 – 79	4	77	308
3	70 – 74	4	72	288
4	65 – 69	6	67	402
5	60 – 64	8	62	496
6	55 – 59	7	57	399
7	50 – 54	6	52	312
8	45 – 49	5	47	235
9	40 – 44	3	42	126
10	35 – 39	1	37	37
Σ		46		2767

1. Prepare the composite table to include the mid points of the class intervals and fx i.e. frequency multiplied by the mid points.
2. Find the sum of fx = 2767
3. Find the sum of f = 46
4. Divide Σfx by $\Sigma f = \frac{\Sigma fx}{\Sigma f}$

$$= \frac{2767}{46} = \underline{\underline{60.15}}$$

There is another methods of computing the mean. This method is called the assumed mean method. You are referred to your basic research method to refresh your memory on that, if you need to use it. For the continuous assessment exercises, you can use any of the two methods you have learnt in this section.

SELF ASSESSMENT EXERCISE

1. Find the mean of the following scores generated from a test by 12 pupils in a class. 30, 40, 54, 20, 60, 72, 34, 42, 31, 40, 16, 25.
2. A group of pupils were given a test each in English and Mathematics. Their teacher computed the mean for the two subjects as follows: English = 70%, Mathematics = 65%. What will be the conclusion of the teacher?

3.2 The Median

This is the mid-point of a set of scores when arranged in a particular order. It is the point on either side of which half the scores lie. In other words, it divides the set of scores into two halves.

If you are given a set of scores to obtain the median, you will need to arrange the scores in order, from the highest to the lowest or from the lowest to the highest. You then count from above or below up to the middle numbers for which there are equal number of cases or scores above and below. For odd number of cases, the median is the middle score. But for even number of cases, the median is half the sum of the two middle scores.

Example 1. For odd number of scores

Find the median of scores: 5, 7, 6, 3, 4, 2, 8, 9, 8.

First step is to arrange them = 2, 3, 4, 5, 6, 7, 8, 8, 9. Then count to get the middle number. You can see that 6 is the middle number. Therefore, 6 is the median.

Example 2: For even numbers of scores.

Find the median of the scores; 12, 14, 10, 8, 9, 15, 6, 7, 11, 13. As usual, arrange them in order = 6, 7, 8, 9, 10, 11, 12, 13, 14, 15. Now if you count from either side, you will see that there are two middle numbers. These are 10 and 11. You will add them and divide by two = $10 + 11 \div 2 = 21 \div 2 = 10.5$. The median is 10.5.

The median is not affected by the presence or addition of extreme scores. Therefore, in the continuous assessment situation, if you are faced with extreme scores, the best measure of central tendency for you to use is the median.

Example 3. For grouped data.

Find the median of the scores

S/N	Class Interval	F	Cf
1	80 – 84	2	46
2	75 – 79	4	44
3	70 – 74	4	40
4	65 – 69	6	36
5	60 – 64	8	30
6	55 – 59	7	22
7	50 – 54	6	15
8	45 – 49	5	9
9	40 – 44	3	4

10	35 - 39	1	1
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$$\text{The median formula} = L + \left(\frac{\frac{N}{2} - Cfb}{f_{10}} \right) i$$

Where L = real lower limit of the median class

N = total number of scores in the scale

Cfb = Cumulative frequency below the median class

F_w = frequency within the median class

i = class interval size.

Now let us take serial number 5, i.e. 60-64 as the median class. Then substituting the formulae we have

$$\begin{aligned} 59.5 + \frac{\frac{46}{2} - 22}{8} \times 5 &= 59.5 + \frac{23 - 22}{8} \times 5 \\ &= 59.5 + 0.625 = \underline{60.13} \end{aligned}$$

Note that the median class is the class with half the number of scores. In the above case you can see that half of 46 is 23. From cumulative frequency 23 is in the class of 60—64.

3.3 The Mode:

In a set of scores, the mode is simply the score that occurred most. It is the most frequent or most popular score. In other words, it is the score with the highest frequency. The mode is the least reliable type of statistical average. Most of the times it is on used a preliminary estimate of central tendency. There is always a score in a distribution which has the highest frequency. When it is only one score, we say the distribution or set of scores is unimodal. Some of the times, there may be two modes. This is called bimodal. It is possible to have more than two modes. In this case, it is called multimodal.

Example 1. Find the mode of the following: 2, 8, 9, 7, 6, 5, 7, 3. You can see that seven (7) is the only score that appeared twice. Therefore, 7 is the mode. This is unimodal.

Example 2. Find the mode of the following: 3, 5, 9, 5, 7, 6, 7, 8. Look at this set of scores. You can see that 5 and 7 appeared twice each. Therefore, this set is bimodal with 5 and 7 as the modes.

Example 1 and 2 are used with ungrouped data. But when the data are grouped, you can use the approximation of the mode method which is getting the mode by locating the class interval with the highest frequency. Then find themed point of the class interval. But when you want to find the actual mode, you can follow the next example.

Example 3. Find the mode of the grouped data below:

The formula is given by $L + \left(\frac{d_1}{d_1 + d_2} \right) i$

Where d_1 = difference between the frequency of the modal class and frequency of the class below it.

d_2 = difference between the frequency of the modal class and frequency of the class above it

i = class interval size.

S/N	Class Interval	F
1	80 – 84	2
2	75 – 79	4
3	70 – 74	4
4	65 – 69	6
5	60 – 64	8
6	55 – 59	7
7	50 – 54	6
8	45 – 49	5
9	40 – 44	3
10	35 - 39	1

From this distribution, you can see that the model class is serial number 5 i.e. 60 – 64. When we substitute, we have

$$59.5 + \left(\frac{8-7}{(8-7)+(8-6)} \right) 5 = 59.5 + \left(\frac{1}{1+2} \right) 5 = 59.5 + \left(\frac{1}{5} \right) 5 = \underline{61.17}$$

Note that for the operations in the continuous assessment, the mean is the most useful of all the measures of central tendency. This is because you can use it as a versatile measure including using it with the standard deviation in the transformation of raw scores into standard scores like the Z-score and T-score. What is the implication? It means that every classroom teacher must be familiar with how to compute the mean from both grouped and ungrouped data.

SELF ASSESSMENT EXERCISE

Find the mode of the following distribution of scores:

T. Interval	85- 89	80- 84	75- 79	70- 74	65- 69	60- 64	55- 59	50- 54
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Frequency	3	5	6	7	10	8	6	4
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4.0 CONCLUSION

You have seen that every teacher operating in the Nigerian educational system where continuous assessment is practiced must be equipped with the computational procedures for determining the measures of central tendency. This is because of the key role they play in the interpretation of pupils scores. We have noted that the mean is used with the standard deviation for the transformation of raw scores of pupils to standard scores. It also mean that you have to be familiar with how to find the standard deviations. Never mind, in the next unit, we shall be looking at the measures of variability where the standard deviation belongs.

5.0 SUMMARY

In this unit, you studied the measures of central tendency or locations. You learnt that there are three of them; the mean, the median and the mode. You were told that the mean is simply the sum of all the scores in the group divided by the total number of scores. It is the most popular of all the measures. You saw how to compute the mean using $\bar{X} = \frac{\sum X}{N}$ or $\bar{X} = \frac{\sum fx}{\sum f}$ for grouped data.

The median is the mid point of a set of scores. You also learnt how to get the median by inspection or by formula in grouped data using $L + \left(\frac{\frac{N}{2} - Cfb}{fw} \right) i$

The mode is the most popular score in a group of scores. You have unimodal, bimodal and multimodal. It can be determined by inspection in ungrouped data and with the formula $L + \left(\frac{d1}{d1 + d2} \right)$ in grouped data.

6.0 TUTOR MARKED ASSIGNMENT

1. Find the mean of the following scores: 20, 30, 40, 50, 45, 60.
2. What is the Median? Find the median of the following: 8, 5, 2, 8, 3, 9, 10, 7, 4, 9
3. What is the mode? Find the mode in the following distribution

Class	60-64	55-59	50-54	45-49	40-44	35-39	30-34	25-29
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Interval								
Frequency	3	4	6	8	7	5	3	2

7.0 REFERENCED/FURTHER READING

Obimba, F.U. (1989). *Fundamentals of Measurement and Evaluation in Education and Psychology*. Owerri. Totan Publishers Ltd.

Ughamadu, K.A. (1994). *Understanding and Implementing Continuous Assessment*. 2nd Ed. Benin City. World of Books Publishers

ANSWERS TO SELF ASSESSMENT EXERCISE

Exercise I

1. $30+40+54+20+60+72+34+42+31+40+16+25 = 463$

$$\bar{X} = \frac{\sum X}{N} = \frac{463}{12} = \underline{\underline{38.58}}$$

2. English $\bar{X} = 70\%$

Maths $\bar{X} = 65\%$

UNIT 4.0 MEASURES OF VARIABILITY

CONTENT

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Measures of Variability
 - 3.2 The Range
 - 3.3 Standard Deviation
 - 3.4 Standard deviation for grouped data
 - 3.5 The Quartile Deviation
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignment
- 7.0 References/Further Reading

1.0 Introduction

In the last unit, you worked through the measures of central tendency or locations which were said to be very important for the continuous assessment activities. You learnt that the mean is a versatile measure, used in conjunction with other tests. It is also used with and also in the computation of the variance and standard deviation. In this unit, you will learn about the measures of variability which gives information about the degree to which scores or values obtained from measurement of pupils achievement vary from one another. However, we shall only look at the range, the variance and standard deviations and a little of the quartile deviation. Details of these and more of the measure you will get in your research methods course materials.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- i. Explain the measures of variability
- ii. Describe the range
- iii. Compute the variance and standard deviations
- iv. Explain the quartile deviations

3.0 MAIN CONTENT

3.1 Measures of Variability

Variability denotes differences in the test scores of individual pupils. Differences can arise as a result of a number of factors. These factors make the scores obtained by an individual different from those obtained from another individual. They even make the scores obtained from by one pupil at one time under certain conditions to be different from the scores which he would obtain some other time under the same or different conditions. In other words, the scores obtained by pupils in tests, assignments, projects and other modes of assessment normally vary considerably. Therefore, there is a need to use statistical tools that will enable you as a teacher to find out the extent to which group of scores vary among from the mean. These statistical tools are called measures of variability.

The concept of individual differences is a well known one in psychology. Pupils are characterized by traits which make them differ from one another. Some of such traits may be peculiar to an individual pupil. They may be common to many pupils but may yet exist in varying degrees in different pupils. Some of such variables or traits are temperament, health propensities, intelligence and capacity for endurance. Pupils performances in tests are influenced by individual differences and other extraneous factors which may be environmental the health, the physical condition, the intellectual capacity, the temperament, the temperature, lighting, ventilation, space available and other general conditions of the room for the test, the absence or presence of distracting noise etc. All these influence the pupils performance in the test. These are included in such qualities as credibility and civility in testing.

The measures of variability therefore indicate how far, uniform, similar or homogenous the group taking a test is or how dissimilar, unlike, or varied or heterogeneous the group is in its qualities and therefore in its scores. For the continuous assessment activities the standard deviation is the most important and will be treated as such.

3.2 The Range

This is the simplest and most straight forward measure of variability. It is the difference between the highest and the lowest score. It is found by subtracting the lowest score from the highest score. It is a quick way of determining the extent or nature of the spread of scores. But it is not a very reliable measure of variability because it is influenced by two extreme scores.

Example I. Find the range of the following scores:

2, 8, 15, 3, 9, 7, 20, 14, 29, 8, 10.

From the scores, you can see that the lowest score is 2 and the highest scores is 29. therefore, the range = $29 - 2 = \underline{27}$. Note that when we talk about the range without any

qualification, it means we are talking about the Exclusive Range. It means that range can be Exclusive or Inclusive. When we say highest score-lowest score + 1 we are referring to the inclusive range.

Standard Deviation

This is the most dependable and most commonly used measure of variability. This is because it takes into account all the scores thereby indicating the extent to which each individual score deviates from the mean score. It shows the homogeneity or heterogeneity of the group. It is a kind of average which indicates the extent to which all the scores deviate or vary from the mean of that set of scores indicating the spread of that set of scores. It is the square root of the variance. It is given by the formula

$$\sqrt{\sum \left(\frac{X - \bar{X}}{N} \right)^2}$$

Example 2: Find the square root of the following scores: 5, 6, 8, 7, 4, 3, 9.

S/N	X	X-X	(X-X) ²
1	5	-1	1
2	6	0	0
3	8	2	4
4	7	1	1
5	4	-2	4
6	3	-3	9
7	9	3	9
\sum	42		28
\bar{X}	7		

this case you can prepare a composite table as shown

1. Find the mean of the scores = 6
2. Find the deviations from the mean
3. Square the deviations from the mean
4. Find the sum of the squared deviations = 28
5. Substitute for the formula

$$S = \sqrt{\frac{28}{7}} = \sqrt{4.00} = \underline{\underline{2.00}}$$

An alternative method of computing the standard deviation is by the use of direct raw scores. This is given by the formula

$$S = \sqrt{\frac{\sum X^2 - \left(\frac{\sum X}{N}\right)^2}{N}}$$

Let use the former example with this formula

$$S = \sqrt{\frac{280 - \frac{42^2}{7}}{7}} = \sqrt{\frac{280 - 252}{7}}$$

S/N	X	X ²
1	5	25
2	6	36
3	8	64
4	7	49
5	4	16
6	3	9
7	9	81
Σ	42	280

$$= \sqrt{\frac{28}{7}} = \sqrt{4} = \underline{\underline{2}}$$

Standard Deviation for Grouped Data:

When you have grouped data, you will use the same methods but you will also use the mid points of the class interval. In this case you will use the formula

$$S = \frac{(\sum f) \sum fX^2 - (\sum fX)^2}{(\sum f)^2}$$

S/N	Class Interval	f	Mid Point X	fX	fX ²
1	30-34	2	32	64	4096
2	25-29	3	27	81	6561
3	20-24	4	22	88	7744
4	15-19	6	17	102	10404
5	10-14	3	12	36	1296
6	5-9	2	7	14	196
7	0-4	1	2	2	4
		21		387	30301

Step i. Complete the composite table

ii. Find $\frac{\sum FX^2}{X} = 30301$

iii. Find $fX = -387$

Substituting we have $S = 21 \times 30301 - 387 \times 387 / 21 \times 21$

$= 636321 - 149769 / 441 = 486552 / 441 = 1103.2925$. The square root of this number is 10.27.

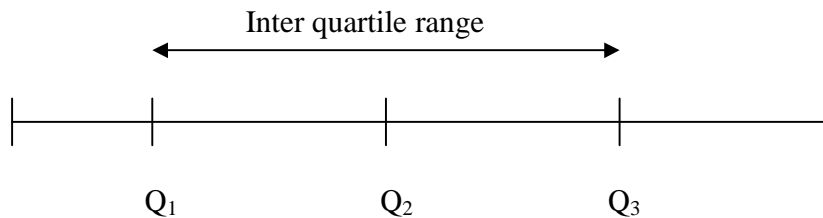
SELF ASSESSMENT EXERCISE

Find the standard deviation of these scores

7, 3, 2, 5, 8, 6, 4

3.3 The Quartile Deviation

This is also called semi interquartile range. The quartiles are points on the distribution of scores which divide the distribution into four equal parts. There are three quartiles and four quartiles. The first quartile, Q_1 is equal to the 25th percentile. The 3rd quartile is equal to the 75th percentile. While the 2nd quartile is equal to the median, the 50th percentile and the 5th decile. If we use a linear representation, we will have:

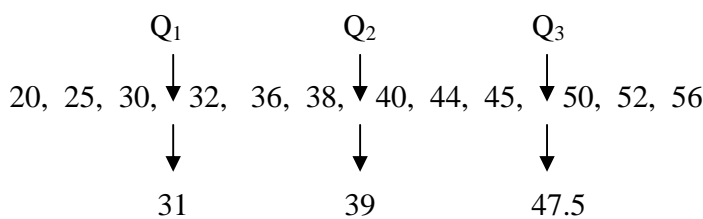


From this diagram, you can see that from $Q_1 - Q_3$ is called the inter-quartile range. If you divide this range by 2 you will have what is called quartile deviation or the semi interquartile range. It is given by $\frac{Q_3 - Q_1}{2}$

interquartile range. It is given by $\frac{Q_3 - Q_1}{2}$

Example: Find the semi interquartile range in the following scores:

20, 25, 30, 32, 36, 38, 40, 44, 45, 50, 52, 56. You need to arrange the scores in order first.



You can see that Q_1 is the point between 30 and 32 i.e. $30 + 32 \div 2 = 31$. Q_3 is got by adding 45 and 50 and dividing by 2 = $45 + 50 \div 2 = 47.5$

If you want to get the semi interquartile range = $\frac{47.5 - 31}{2} = 8.25$

For grouped data, consult your basic research.

4.0 CONCLUSION

In the continuous assessment activities, the measures of variability are very important. You know that you have to compare the homogeneity or otherwise of the scores generated. You have to transform the raw scores to standard scores. You need to use the standard deviation to do all these. Again, you also need to group scores when you have large number of scores. It means you need the range too. You should therefore study them with extra care.

5.0 SUMMARY

In this unit, you have studied the measures of variability you have studied the range which we said is the highest minus the lowest scores. You also studied the standard deviation which we said is the square root of the variance. You have seen the methods of computing the standard deviation. The quartile are the points which divide a distribution of scores into four equal parts. $Q_1 = 25^{\text{th}}$ percentile. $Q_3 = 75^{\text{th}}$ percentile. $\frac{Q_3 - Q_1}{2} =$ semi interquartile range or quartile deviation.

6.0 TUTOR MARKED ASSIGNMENT

Given the following set of scores: 6, 8, 11, 14, 10, 9, 5, 12

- i. Find the range
- ii. Find the standard deviation

7.0 REFERENCE/FURTHER READING

Obimba, F.U. (1989). Fundamental of Measurement and Evaluation in Education and Psychology. Owerri. Totan Publishers.

Ughamadu, K.A. (1994). Understanding and Implementing Continuous Assessment. 2nd ed. Benin City. World of Books Publishers.

ANSWERS TO SELF ASSESSMENT EXERCISE.

S/N	X	$X - \bar{X}$	$(X - \bar{X})^2$
1	7	2	4
2	3	-2	4
3	2	-3	9
4	5	-0	0
5	8	3	9
6	6	1	1
7	4	-1	1
Σ	35		28

$$\bar{X} = 5$$

$$S = \sqrt{\frac{28}{7}} = \sqrt{4.00} = \underline{\underline{2.00}}$$

ANSWERS TO TUTOR MARKED ASSIGNMENT

1. the range = $14 - 5 = \underline{\underline{9}}$

S/N	X	$X - \bar{X}$	$(X - \bar{X})^2$
1	6	-3.4	11.56
2	8	-1.4	1.96
3	11	1.6	2.56
4	14	4.6	21.16
5	10	0.6	0.36
6	9	-0.4	0.16
7	5	-4.4	19.36
8	12	2.6	6.76
Σ	75		63.88

$$\bar{X} = 9.4$$

$$S = \sqrt{\frac{63.88}{8}} = \sqrt{7.985} = \underline{\underline{2.83}}$$

UNIT 5.0 STANDARD SCORES

CONTEN

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Transformation of Raw Scores
 - 3.2 Z-Scores
 - 3.3 T-Scores
 - 3.4 Stanine Scores
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignment
- 7.0 References/Further Reading

1.0 INTRODUCTION

In the last unit you learnt that the standard deviation which is a measure of variability is a very versatile measure which can be used in conjunction with the mean which is a measure of central tendency or location in transforming the raw scores into standard scores. You know that the scores generated by the teachers directly from tests or examinations and other modes of assessments in the continuous assessment activities are called raw scores. For these scores to be meaningful and useful, they have to be transformed into standard scores. You have already studied the percentile ranking in the previous unit. In this unit you will learn about the T-score, Z-score and the Stanine scores

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- i. explain transformation of raw scores
- ii. transform raw scores to Z-scores
- iii. transform raw scores to T-scores

3.0 MAIN CONTENT

3.1 Transformation of Raw Scores

Transformed scores are also known as derived or converted scores. Raw scores are transformed to percentile rank and the standard scores to be useful and meaningful. The standard scores are the Z-scores, T-score and Stanines. They involve statistical transformations designed to facilitate the process of the interpretation or giving meaning to a test score in relation to a group of scores. In the continuous assessment, activities teachers are required to be able to transform raw scores of the pupils to percentile ranks and standard scores. For you as a classroom teacher, to be able to compare the pupils performances meaningfully, you need to transform their raw scores to percentile ranks. But for you to combine scores from different sources, the scores have to be transformed to standard scores. The most popular standard score is the T-score.

3.1.1 Standard Scores

Transformed scores are called standard scores when they are based on the standard deviation. They are a transformation of raw scores of a distribution to a new type of distribution that has a preferred arithmetic mean and standard deviation. They are popular in the representation and interpretation of relative performance of pupils on a norm-referenced test because raw scores cannot be meaningfully compared. All the standard scores provide common basis that permit meaningful comparison of test scores. There are different types of standard or derived scores. Each of them has its own arithmetic mean and standard deviation. But the chief of them all is the Z-score. It is from the Z-score that the others are derived or improved. Note that standard scores in different subjects by a pupil can be added together. You know that percentile ranks cannot be added. You know that it is misleading to compare performance of pupils using percentages or raw scores. Look at this example: A pupil X scored 60% in test A in Arithmetic. Another pupil Y scored 80% in test B in the same Arithmetic. By mere looking at the two scores, you will jump to a conclusion that pupil Y's performance is better than that of pupil X. this is a wrong conclusion. It is possible that test A is more difficult than test B. again if pupil Z scores 45% in Mathematics, 80% in English, 70% in CRK etc. it is also wrong to compare the performance of this pupil based on these raw scores. This is because, there is no common scale for comparison. It is therefore more meaningful and useful to bring all the scores obtained by a pupil in different subject or in different tests into the same scale. It is also possible to bring the scores by different pupils in the same or even different subjects and different test to a common scale. If you do this, we can say that the scores compare meaningfully. Do you know that the Federal Government Handbook on Continuous Assessment did recommend the use of T-scores in the continuous assessment activities in our schools.

3.2 Z-Score

This is a deviation from the mean divided by the standard deviation. It tells us how many standard deviations above or below the mean raw scores falls at. For a set of Z-scores,

the mean is always 0 (zero) and the standard deviation is 1 (unity). In order to transform a raw scores to a Z-score, you use the formula: $Z\text{-score} = \frac{\text{Rawscore} - \text{Mean}}{\text{Standard deviation}}$

This can be represented symbolically as $Z = \frac{X - \bar{X}}{S}$

Example I: Given the following raw scores obtained by some pupils in a class as 20, 50, 45, 30, 25, 15, 35. Find the Z-scores for 20, 50 and 35.

Step 1 – Find the standard deviation of the scores

S/N	Raw Score	$X - \bar{X}$	$(X - \bar{X})^2$
1	20	-11.43	130.64
2	50	18.57	344.84
3	45	13.57	184.14
4	30	-1.43	2.04
5	25	-6.43	41.34
6	15	-16.43	269.94
7	35	3.57	12.74
Σ	220		985.68

$$\bar{X} = 31.43$$

$$S = \sqrt{\frac{\sum (X - \bar{X})^2}{N}} = \sqrt{\frac{985.68}{7}} = \sqrt{140.81143} = 11.87$$

Step 2: Using $Z = \frac{X - \bar{X}}{S}$ Find the Z-scores given:

$$i. \quad Z_{20} = \frac{20 - 31.43}{11.87} = \frac{-11.43}{11.87} = \underline{\underline{0.96}}$$

$$ii. \quad Z_{50} = \frac{50 - 31.43}{11.87} = \frac{18.57}{11.87} = \underline{\underline{1.56}}$$

$$iii. \quad Z_{35} = \frac{35 - 31.43}{11.87} = \frac{3.57}{11.87} = \underline{\underline{0.30}}$$

If you take a critical look at the Z-scores, you will notice that the values have negative, positive and decimal values. It is a problem during interpretation. To avoid the negative values T-score becomes handy. This is why we say that the T-score is an improvement of the Z-score.

3.3 T-score

This has a standard deviation of 10 and arithmetic mean of 50. It is got by multiplying the Z-score by 10 to remove the decimal points and adding 50 to remove the negative values. So, to obtain the T-score you will use the formula $T = 50 + 10Z$ where $Z = \frac{X - \bar{X}}{S}$. In other words T-score is given by $T = 50 + 10 \left(\frac{X - \bar{X}}{S} \right)$

Example 2: Let us use the scores in Example 1

It means that $Z_{20} = -0.96$

Therefore $T_{20} = 50 + 10 \times -0.96 = 50 - 9.6 = \underline{40.04}$

For $Z_{50} = 50 + 10 \times 1.56 = 65.6$

For $Z_{35} = 0.30$

Therefore, $T^{35} = 50 + 10 \times 0.30 = \underline{53.0}$

Now if the T-scores of pupils in different subjects are computed, the values can be compared. This is because, they are now on the same scale. They can also be added. As a class room teacher, you should be able to have the skills necessary for computing mean and standard deviation of raw scores obtained by your pupils. These will help you to convert scores into T-scores. This is to conform and adhere to the National Education Law which requires that raw scores be converted to T-scores for meaningful comparison of the performances of pupils.

SELF ASSESSMENT EXERCISE

Given that the mean of a set of scores is 7 and the standard deviation is 2.78, calculate T-scores of (i) 3 (ii) 5 (iii) 9 (iv) 7 (v) 10

3.4 Stanines

The scale here is another standard scores system used for converting raw scores obtained from standardized tests. It is pronounced as stay-nine. It is a contraction of standardized nine. It simply means standard scores with nine categories. These categories are 1, 2, 3, 4, 5, 6, 7, 8, 9. To convert raw scores into stanine scores, follow these steps.

- i. Arrange the scores in rank order from the highest to the lowest
- ii. Assign the top 4% to stanine score of 9
- iii. Assign the next 7% to stanine score of 8
- iv. Assign the next 12% to stanine score of 7
- v. Assign the next 17% to stanine score of 6
- vi. Assign the next 20% to stanine score of 5
- vii. Assign the next 17% to stanine score of 4

- viii. Assign the next 12% to stanine score of 3
- ix. Assign the next 7% to stanine score of 2 and
- x. Assign the next 4% to stanine score of 1

The examination bodies in Nigeria make use of the stanine scores. Such examination bodies like WAEC, NECO, NABTEB etc. use the stanine in interpreting the results of their candidate. In their own case instead of top 4% assigned to stanine 9, it is assigned to stanine 1. So they use the reverse of what we have here. It means that the last 4% is assigned to 9.

4.0 CONCLUSION

As a teacher, you need to be competent in the computation and use of the standard scores. It is compulsory and also stated in the Nigerian Education Law. This is why this unit has been devoted to it. You will have no excuse of not doing what you are supposed to be doing as a classroom teacher. You need to give appropriate interpretation to the scores obtained by your pupils in their assessment.

5.0 SUMMARY

In this unit, you learnt that transformed scores are called derived or converted scores. They involve statistical transformation designed to facilitate the process of meaningful interpretation of scores. You also learnt that transformed scores are called standard scores because they are based on standard deviations. The Z-score is a deviation from the mean divided by the standard deviation. The mean is always zero and the standard deviation is one. The formula is $Z = \frac{X - \bar{X}}{S}$ mean of 5. It is used to remove the negative and decimal points in the Z-score. It is given by $T = 50 + 10Z$. The stanine score is used for converting raw scores obtained from standardized tests into nine categories. It is mainly used by examination bodies like WAEC, NECO and NABTEB.

6.0 TUTOR MARKED ASSIGNMENT

Given that a set of scores has a mean of 58.75 and standard deviation of 14.7, find (i) T_{43} (ii) T_{67} (iii) T_{50} (iv) T_{80}

7.0 REFERENCES/FURTHER READING

Obimba, F.U. (1989). Fundamentals of Measurement and Evaluation in

Education and Psychology. Owerri. Totan Publishers Ltd

Ughamadu, K.A. (1994). Understanding and Implementing Continuous Assessment. 2nd ed. Benin City. World of Books Publishers.

ANSWERS TO SELF ASSESSMENT EXERCISES

$$\bar{X} = 7, S = 2.78, T = 50 + 10 \left(\frac{x - \bar{X}}{S} \right)$$

$$\therefore T_3 = - \left(\frac{3-7}{2.78} \right) 10 + 50 = \left(\frac{-11}{2.78} \right) 10 + 50 = \underline{\underline{35.61}}$$

$$T_5 = \left(\frac{5-7}{2.78} \right) 10 + 50 = \left(\frac{-2}{2.78} \right) 10 + 50 = \underline{\underline{42.81}}$$

$$T_9 = \left(\frac{9-7}{2.78} \right) 10 + 50 = \left(\frac{2}{2.78} \right) 10 + 50 = \underline{\underline{57.19}}$$

$$T_7 = \left(\frac{7-7}{2.78} \right) 10 + 50 = \left(\frac{0}{2.78} \right) 10 + 50 = \underline{\underline{50.00}}$$

$$T_{10} = \left(\frac{10-7}{2.78} \right) 10 + 50 = \left(\frac{3}{2.78} \right) 10 + 50 = \underline{\underline{60.79}}$$

ANSWERS TO TUTOR MARKED ASSIGNMENT

$$\text{Given } \bar{X} = 58.75, S = 14.7, T = 50 + 10 \left(\frac{X - \bar{X}}{S} \right)$$

$$\text{Therefore, } T_{43} = \left(\frac{43-58.75}{14.7} \right) 10 + 50 = \left(\frac{-15.75}{14.7} \right) 10 + 50 = \underline{\underline{39.29}}$$

$$T_{67} = \left(\frac{67-58.75}{14.7} \right) 10 + 50 = \left(\frac{8.25}{14.7} \right) 10 + 50 = \underline{\underline{55.61}}$$

$$T_{50} = \left(\frac{50-58.75}{14.7} \right) 10 + 50 = \left(\frac{-8.75}{14.7} \right) 10 + 50 = \underline{\underline{44.05}}$$

$$T_{80} = \left(\frac{80-58.75}{14.7} \right) 10 + 50 = \left(\frac{21.25}{14.7} \right) 10 + 50 = \underline{\underline{64.46}}$$